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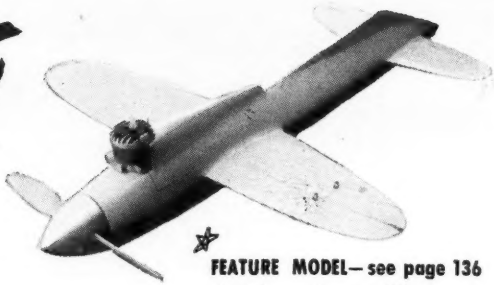

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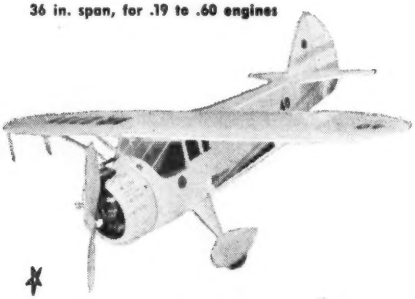

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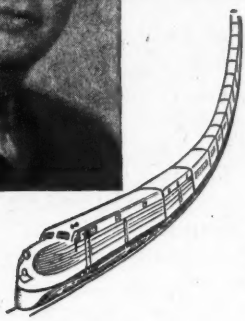

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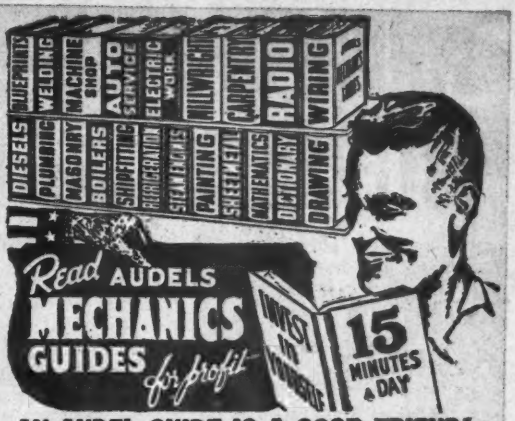

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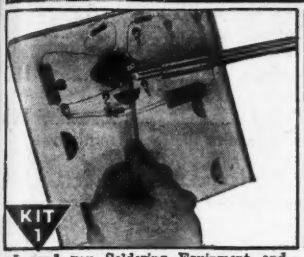

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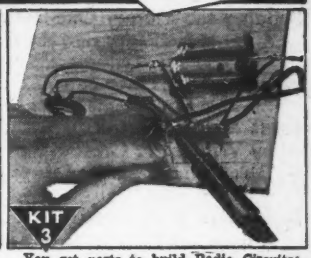

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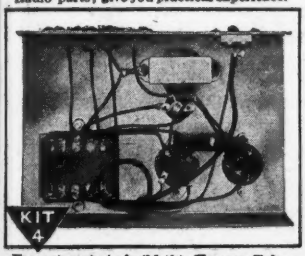

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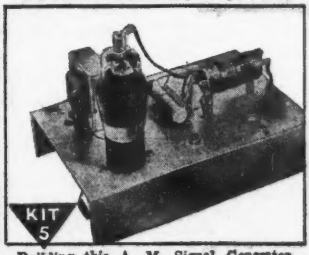

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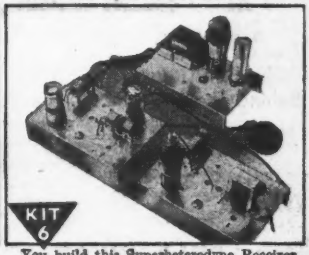

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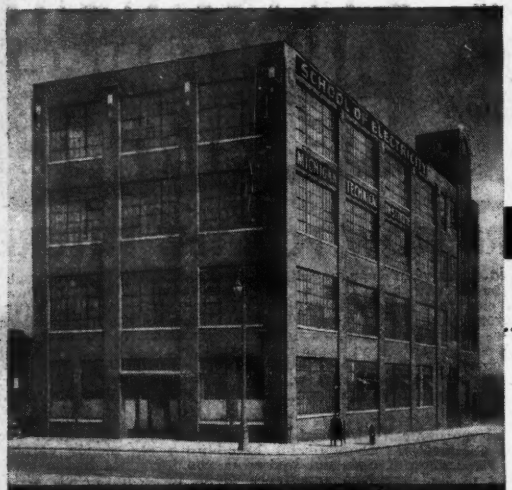

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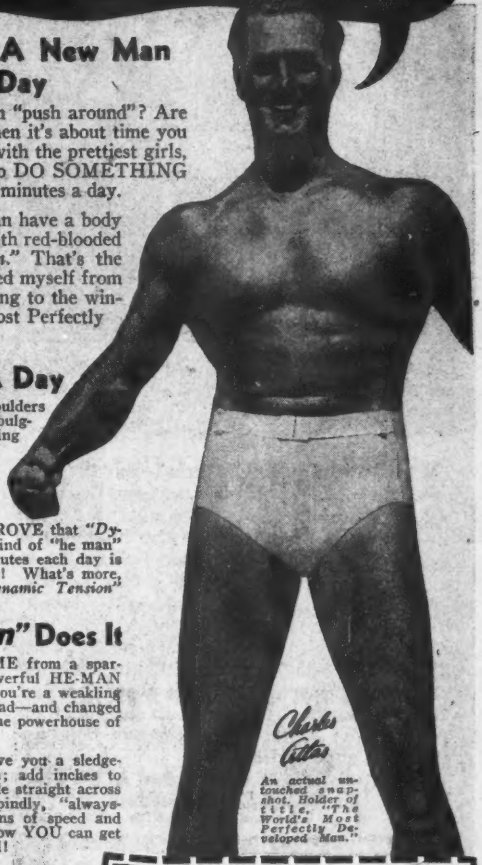

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CHIPS from the EDITOR'S WORK BENCH

"Cruise-Mate" at MI's Crafts and Science Show.

Coming Attractions

Remember the old chestnut about the man who built a boat in his basement and then had to tear down a wall to get it out? Well, the June issue of MI will have the plans for a 12-ft. utility boat that you can build in your cellar and which Bill Duggan, our Boating Editor, guarantees will come out *without* wrecking the house. (If it doesn't, Bill will help you do the wrecking.) The boat isn't built with mirrors—it's simpler than that—it's made in sections. Three of them to be exact, that you can carry in the trunk of your car and then lock together to form a watertight boat for rowing or outboard use.

This is only one of the features in MI's Big 1947 Boating Program that will bring you the best in small boat designs. For example on page 124 of this issue, we're launching (no pun intended) a brand new racing class, the *Victory* One-design, an 18-ft. sailboat designed by William F. Crosby, creator of the famous *Snipe* class.

If cruising is your game, then we hope you didn't miss our April issue and the complete building plans for *Cruise-Mate* a 19-footer with full living accommodations for two, plus a large cockpit for loafing and economical outboard power. Incidentally, the original boat was displayed in the MI Booth at the National Crafts and Science Show in Madison Square Garden last November. The cruiser attracted thousands of visitors and the boys in the MI booth say they turned down a half dozen cash offers (most of them in four figures) to buy the boat.

Still coming up in the very near future are plans for a 9-ft. knockabout that will practically sail in a heavy dew (California style) and which will give kids from eight to eighty the time of their lives, plus a sound training in small boat handling. Be sure and watch for this one—if you have a youngster of sailing age, it will be well worth your while.

Know Your Jets and Turbines?

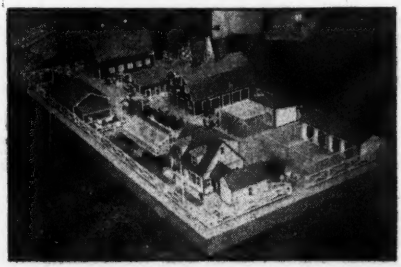
As Britain and the United States continue their race to be first to fly a jet-propelled plane faster than the speed of sound, Aircraft Books, Inc., 370 Lexington Avenue, New York City, announces publication of the new, enlarged fourth edition of "Gas Turbines And Jet Propulsion For Aircraft," by G. Geoffrey Smith. (Cloth Cover $5.)

The editorial director of "Flight" and "Aircraft Production," Smith is an internationally known authority on jet-propulsion, described as the greatest revolution of the aeronautical science since the Wright Brothers made their first flight at Kitty Hawk 43 years ago.

Preface of the new volume is written by Gen. Carl A. Spaatz, Commanding General,

[*Continued on page* 14]

DOWN ON THE FARM



Leopold Armbrustia of Long Island City brings the good earth to his living room floor with this scale model of a model farm. Looks like a painstaking piece of work for which the editors are glad to send you a Workbench Award and a $5.00 check. Makes us feel most nostalgic.

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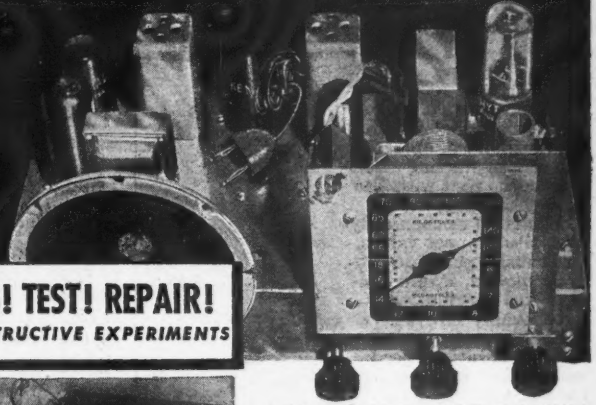

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Editor's Workbench Chips

[*Continued from page* 12]

United States Army Air Forces, who warns that the United States is destined to become a second-rate power in aviation unless a large reserve of young engineers with the proper "know-how" is developed.

Gen. Spaatz states: "We are depending heavily upon civilian industry and science to train qualified technicians to provide us with the newest and most powerful aircraft possible. Charged as we are with the air defense of the United States, we must continue our research and development toward better and still better military aircraft."

MI's Annual Color Photo Contest

Next month's issue will contain news of especial interest to our photography-minded readers—the announcement of our Fourth Annual Color Photo Contest. The prizes? Three hundred dollars in cash with a first prize of $100.

Color prints and transparencies of any size or type (except hand-colored prints) may be entered. Full details, as well as typical prize-winning photos in full color, will be printed in the June issue.

Man Driver Vs. Woman Driver

Here's new evidence in the argument as to whether men are better drivers than women:

Tests conducted by Ohio state highway safety engineers showed that men are quicker to apply the brakes after seeing a hazard.

In tests on more than 1,000 drivers, the engineers found that men had an average reaction time of fifty-seven hundredths of a second, compared with sixty-two hundredths of a second for women.

Your reaction time increases with age, the tests revealed, but persons under the age of 20 are slower in applying the brakes than those in the 20-29 group. Above the age of 29, the time increased.

No Low-Cost A-Power Until 1960

Low-cost atomic power will not be available before 1960, according to War Department atomic experts.

Engineering problems must be solved before the power of the atomic bomb can be turned to power use, scientists believe. The two big problems are getting structural materials which will withstand the high temperatures of the atomic pile and developing methods of getting the heat out of the system.

Atomic power for naval vessels and for use in out-of-the-way places where other fuels

[*Continued on page* 16]

INVENTORS

Patent Laws Encourage The Development Of Inventions

The Rules of Practice of the U. S. Patent Office advises—unless an inventor is familiar with such matters—that he employ a competent registered attorney, as the value of patents depends largely upon the skillful preparation of the specifications and claims.

The firm of McMorrow, Berman and Davidson is registered to practice before the U. S. Patent Office. Additionally, it maintains a staff of attorneys able to readily understand inventors' disclosures, to advise concerning patentability, and to prepare appropriate specifications and claims for filing with the Patent Office.

If an inventor believes he has an invention, a search of the most pertinent prior U. S. patents should be made and a report obtained relative to its patentability. Where such report indicates that the invention appears patentable, in order to secure protection, diligence should be exercised in making application for a patent.

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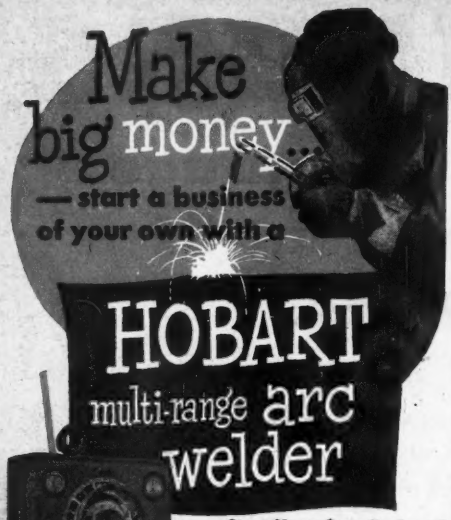

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Editor's Workbench Chips

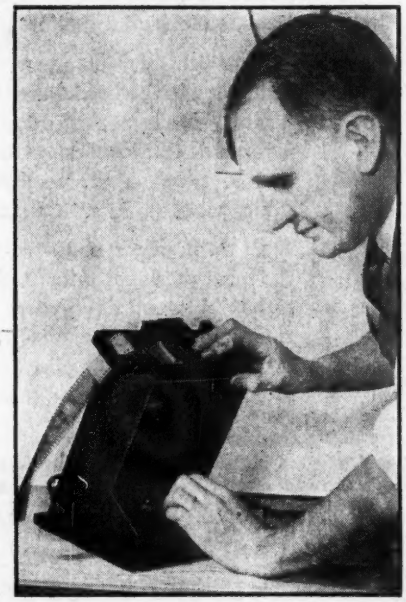
[*Continued from page* 14]

are not available, such as perhaps the Antarctic, were suggested as early applications.

The atomic power plant being built at Oak Ridge, Tenn., was described as the first model of a nuclear machine to produce useful amounts of power. "But," it was added, "we are a long way from realizing a practical nuclear pile that will compete with coal or oil as a source of power."

When atomic power is perfected, the scientists said a plant big enough to supply a city of 100,000 persons could be housed in a relatively small two-story building. Atomic power piles of the future will use enriched uranium 235 and be much smaller than the massive Hanford, Wash., plant which runs on natural uranium.

MI JIFFY SLIDE PRINTER



The original of this Slide Printer appeared in the August 1946 issue of MI; the duplicate, pictured above, was built by John Larsen of Geneva, New York, to whom we are sending a Workbench Award and a $5.00 check.

Blind Read By Sound

Blind persons can read by ear with a new electronic reading aid which converts printed letters into distinctive sounds for the sightless reader.

To read with the electronic device, the blind person scans the printed or typewritten page

[*Continued on page* 18]

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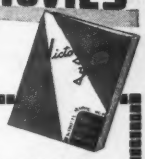

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Jerry, the talking dog, is entertaining hospitalized veterans, by courtesy of the PYROIL Company. Picture of Jerry, sent on request.

Editor's Workbench Chips

[*Continued from page* 16]

with a stylus that looks like a large black fountain pen. A small beam of light in the "point" of the stylus moves up and down on each letter, reflecting to a phototube that operates an amplifier tube.

A combination of five different sounds is produced for each letter as the stylus moves over the printed matter. The reader hears the "pips" through a hearing-aid-like ear attachment. Total weight of the electronic unit is only five and one-quarter pounds.

Work is now underway on an instrument using the same principles to form the actual sound of each letter. This would spell out each word for the blind person as he scans print with the stylus.

Certificates of Merit

Certificates of Merit have been awarded to the following home workshop enthusiasts:

William L. McCollum, Napa, Calif.
C. A. Kelly, Belgrave, Ont.
Anthony Marchitto, New Haven, Conn.
Paul Robert, Montreal, Can.
Jim Bevell, Chattanooga, Tenn.
Carl Hyslop, Brantford, Can.
K. M. Damkier, Oakland, Calif.
John Hutchens, Yorktown, Tex.
Grant Gerow, Kingston, Ont.
Carl Brandel, Hart, Mich.

Pictures On The Spot

"One-minute photography"—the dawn of a new era in snapshooting—was heralded at the winter meeting of the Optical Society of America in New York with the first public demonstration of Edwin H. Land's "one-step camera."

Mr. Land, who is president and research director of the Polaroid Corporation, had his picture taken, by flash, with a ground-glass camera fitted with a modified roll-film back. He quickly walked over to the camera, wound a key which pushed a sandwich of negative film and printing paper out of a slit at the back of the camera attachment. Mr. Land then detached the sandwich from the camera and stripped away the negative from the paper—and there was his finished portrait, dry and permanent—one minute after exposure!

This one-step camera loads ordinary roll film on one of its spools and a special print paper on the other, both materials channeled to the light-trapped exit slit. The paper has breakable "bubbles," each containing hydroquinone and hypo, standard photo finishing chemicals before each frame.

Look for a complete description and analysis of this revolutionary process by Norman C. Lipton, MECHANIX ILLUSTRATED'S special photographic writer, in an early issue. ●

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Trousers Presser

Dale G. Kilburn, Casper, Wyoming, wants to have a model made but states he cannot properly describe it in writing.

ANSWER: *Anyone capable of writing a letter such as you did should have no difficulty in outlining to a model maker the sort of trousers presser which you have in mind. The chance is good that any metal worker in your own home town could build such a device. Maybe it will be a blacksmith, a tinsmith, or even a school student.*

The best thing for you to do is to make a model entirely of cardboard. You can cut the cardboard and paste the pieces together, or you can bend the cardboard into the shape desired, cutting it with knife or scissors and gluing a number of pieces together for required thickness. Then send this cardboard model to a model maker even if he is out of town, and specify the nature and construction of the various parts. We feel sure that he will be able to convert the cardboard construction into metal.

Shaped Tub

Melvin J. Schugel, New Ulm, Minnesota, wants to know what we think of a special tub design to fit washing machines.

ANSWER: *We do not see on what basis you expect to file for a patent on your washing machine and tub combination. The inverse curve on the tub is not basically new. Even steam engines used this general design. The gas tanks of many outboard engines have similar shapes. The technical name under which these tanks come is "saddle tanks."*

Unless you have something more than is disclosed in your brief outline, we cannot see that you have anything new or worthwhile.

Venetian Blinds

W. E. Derr, Philadelphia, Penn., inquires about a take-apart design for Venetian blinds.

ANSWER: *A number of Venetian blinds with removable slats is available on the market. In these the cords are unhooked at the bottom and the slats are pulled out. Tapes and cords may then be washed and the slats may be dropped into the bathtub for their washing after which the units are reassembled. Such a design differs somewhat from yours, the difference however appears to favor those on the market.*

We believe that the entire Venetian blind business could stand some real constructive thought and we would suggest that you try to improve on what already has been accomplished and that you try to produce something better than just a mere substitute. We feel sure that there must be a better answer to the problem of cleaning as well as to the making of the items. Furthermore someday some inventor will propose a Venetian blind which can be fitted easily to any width of window without the necessity of requiring a custom fitting for each window.

When such a superior design presents itself, have an attorney institute a search. Remember, however, that the production costs of the finished item should be lower than at present yet still show you enough profit to cover your patent and royalty requirements in addition to manufacturing and sales costs.

Sound Recording System

Allerico Bottini, New York City, N. Y., proposes a new method of sound recording and asks us for an expression of opinion.

ANSWER: *Whenever conversions take place there is always some loss. Changing sound to radio frequencies and then back to sound frequencies and from those sound frequencies to radio frequencies only to be returned to sound frequencies again seems to us to be entirely unnecessary and we cannot conceive of any gain.*

When you hear music from an orchestra, you hear it as a composite whole, not as individual instruments. But your two ears are likely to hear the sound just a little differently. In an attempt to achieve this effect, two microphones sometimes are set up, two sound tracks are recorded, and two speakers then reproduce the recorded sounds. This is known as

[Continued on page 22]

ADVICE *for the* INVENTOR

The United States Patent Office advises the inventor, unless he is familiar with such matters, to employ a competent, registered patent attorney since the value of a patent depends largely upon the skillful preparation of the specifications and claims set forth in his application.

PRELIMINARY STEPS *toward* PATENT PROTECTION

The Evidence of Invention form mentioned below is offered as a convenience to the inventor in making his disclosure of invention. The inventor should date and sign his disclosure and have it witnessed by two or more persons who are capable of understanding his invention. The disclosure should then be mailed together with the inventor's authorization to conduct a preliminary search at the U. S. Patent Office among previously granted U. S. Patents for similar types of invention. A report is then prepared on the probable patentability of his invention and a recommendation made as to the further course he should take in regard to his invention, provided that the patentability report indicates possible patentability.

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Your Invention Clinic

[*Continued from page 20*]

stereoscopic sound, and has been demonstrated. It would seem to be much better than your proposal.

Soap Bubbles and Soap

W. J. Mathiesen, San Francisco, California, asks about developing a soap bubble toy idea.

ANSWER: *Your suggestion for using the cupped hands to mold soap bubbles is good but not, strickly speaking, new. In many experimental demonstrations on soap films the writer has used his hands to produce bubbles. However, the method was not the same as disclosed by you. Wire loops are better; they are very cheap to construct, and you don't get your hands wet.*

On the other hand, your suggestion for manufacturing a cake of soap exclusively for soap bubble blowing purposes is ideal provided that you can formulate a satisfactory soap for this purpose. Up to the present time the best solutions which the writer has used were made from distilled water, castile soap and glycerine, or the much more tenacious oil film solutions which were available in most 5-and 10-cent stores. Now, you cannot package in solid form either the glycerine or the distilled water. But if you can hit upon a satisfactory substitute, we feel quite sure that you should be able to go to town using ordinary clay pipes, or loops or some of the many wire forms frequently employed for soap bubble demonstrations. We would recommend that you give this matter further thought and forget about the hand method of producing soap bubbles. The child will get too much soap in his mouth or his mother may object because the youngster's hands stay constantly wet.

Flettner Rotor

H. B. Turner, Tampa, Florida, asks for calculations on the Flettner rotor.

ANSWER: *If you will consult any good text on physics you will probably locate the calculations for the Flettner rotor. This entire phenomenon is based on the Bernoulli effect. There is much more to the calculation than can be based on the brief outline presented by you. You must know if disks are to be fitted to the top and bottom of the rotating cylinder. You should know the nature of the material, its composition and finish, and many other details not disclosed by you.*

If you contemplate using the rotor principal or the Flettner rotor for a vertical windmill or as substitutes for sails on ships or for vertical ascent of airplanes, forget it.

We would recommend that you do some extensive investigating on the Bernoulli effect and the Flettner rotor.

[*Continued on page 24*]

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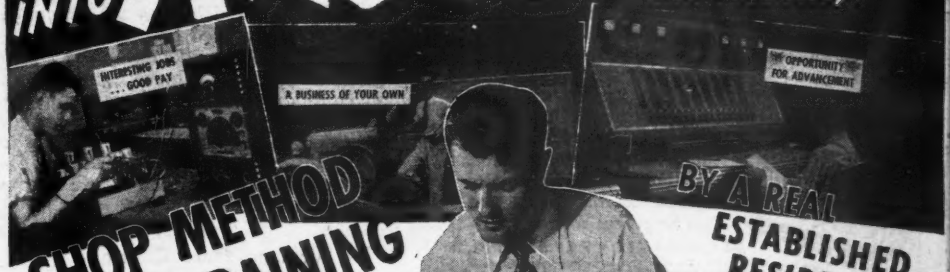

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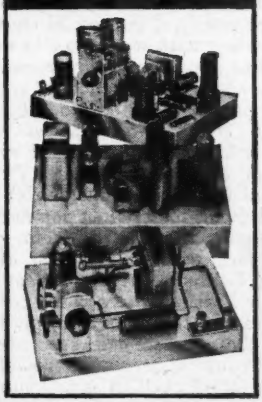

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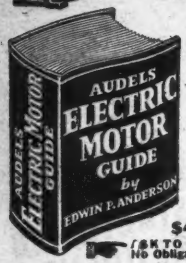

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Your Invention Clinic

[*Continued from page 22*]

"Drilling" Square Holes

John M. Francis, Haverhill, Massachusetts, asks what we think about a method for cutting square holes in wall or similar board.

ANSWER: *If we understand your disclosure for making square holes in fiber board, wood, and other light materials then we cannot see that you have conceived anything new.*

Tools of this type have been on the market for a great many years. You will find them in any tool catalogue. Basically there is a bit surrounded by a square form. After the bit goes through the work the square form is pushed down through it by continuing pressure. Before you continue further we would recommend a search.

Airplane Brake Control

D. J. Gibbons, Odessa, Texas, cracked his plane up by nosing over. He thinks he has an interlocking brake system which will prevent this.

ANSWER: *We are not so sure that your brake control system will prevent you from nosing your plane over. The only thing which this will do is to prevent you from applying the brakes until all three wheels are on the ground. In spite of this, we believe that when the brakes are applied rapidly you will nose over.*

Now a system could be envisioned which would prevent you from nosing over in any case. This would be some means or method for corelating the rotating speed of your wheels with relation to the safety factor of the plane. In other words, if you could cause those wheels to rotate with a constantly diminishing speed but never any more rapidly than your tip-over speed your chances of nosing over would be greatly lessened. Now there are a great many extremely delicate factors which must be considered in this case. First, there is the factor of your air speed. This should be maintained at a fairly constant level and that is quite difficult to do when you have different winds. Again, there is the factor of the frictional surface upon which you are landing. This may be dirt, concrete, or some other material. Furthermore there is the condition of your tires and the amount of air in those tires. All of these factors are responsive to controls but the controls become extremely complicated when interlocked. A much more simple drag system could be envisioned.

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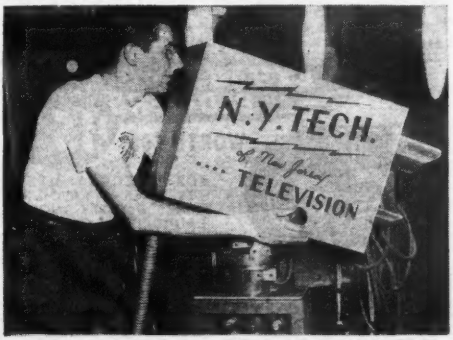

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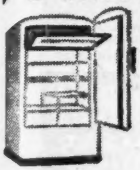

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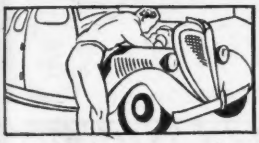

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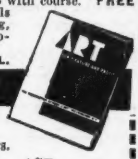

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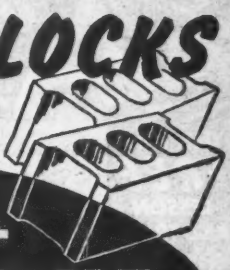

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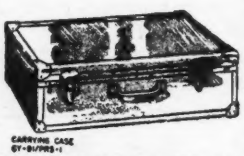

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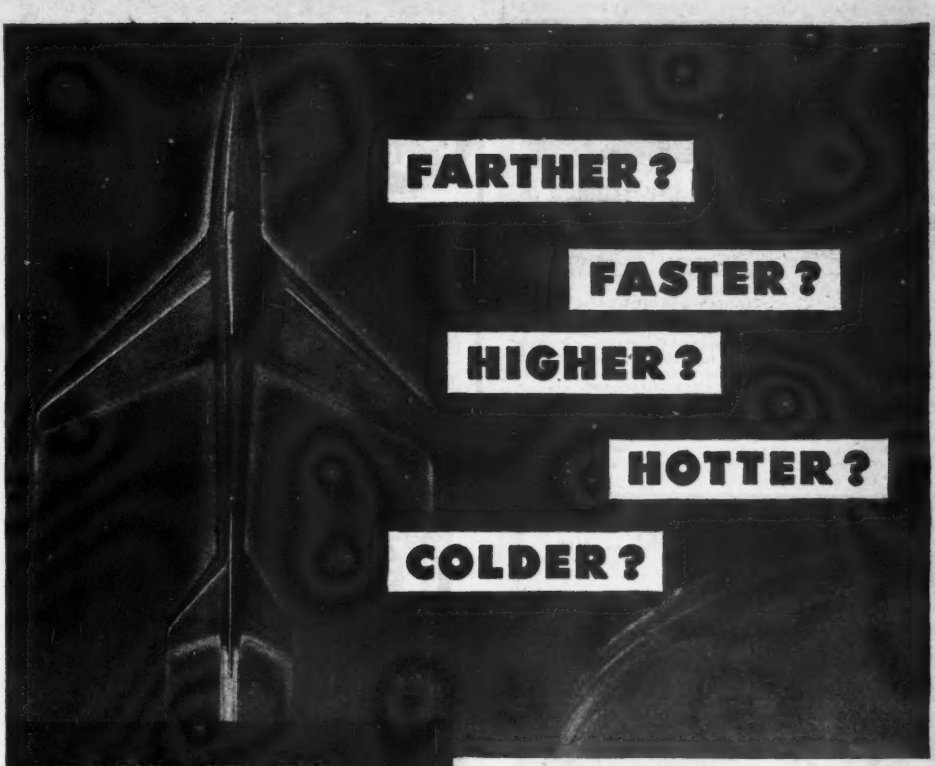

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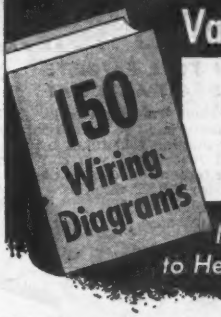

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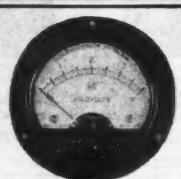

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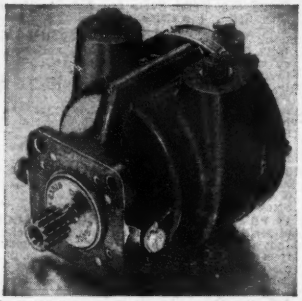

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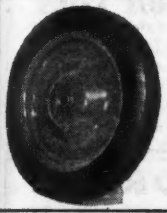

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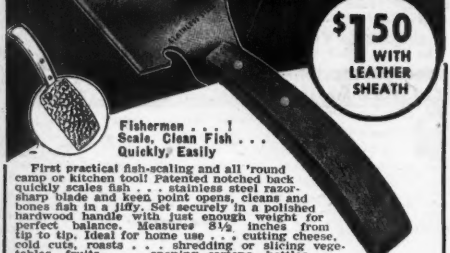

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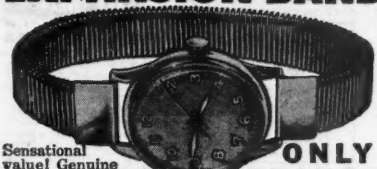

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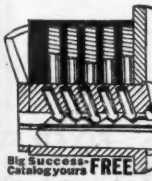

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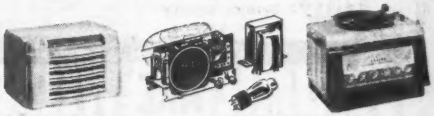

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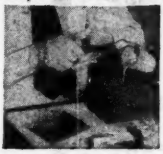

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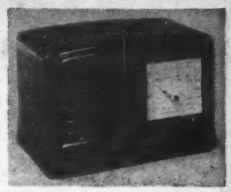

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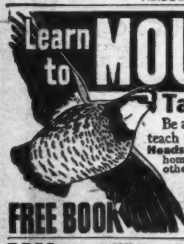

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may 1947

Man of the Monsters

Here's a genius who makes prehistoric monsters that 'live.'

BY LOUIS HOCHMAN

SOME learned scientists and explorers are content to probe Mother Earth for moldy remnants of prehistoric monsters, but not George Harold Messmore. This energetic little man with big ideas and accomplishments to match simply built himself a dinosaur factory in the heart of New York and proceeded to turn out his own staggering array of life-size, breathing, eating, fighting, snarling, replicas of the huge creatures that roamed the earth long before man had a tail to hang by. Powered by from one to 17 silent motors, operating a complicated mass of cogs, wheels, cams, chains, and bellows beneath canvas and papier-mache hides, huge dinosaurs, stegosaurs, allosaurs,

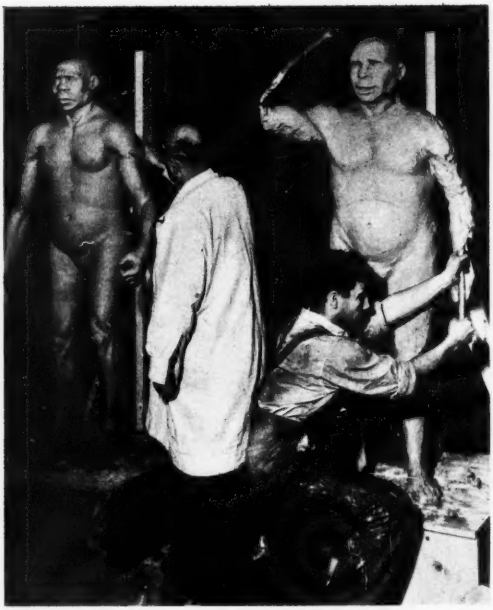
Mechanism of the reincarnated ground sloth, bottom, allows it to move, breathe and grunt.

Man of the Monsters

The hand of the master fashioned this pterodactyl, first creature to grow wings and fly.

Here Messmore adjusts the funny bone of one of his talented mechanical clowns.

A shake of our family tree and out drop two distant relatives—Java Ape Man and Neanderthal Man.



saber-tooth tigers, mastodons and other monsters lash their tails, blink their eyes, gnash their teeth, swing their heads and limbs and emit frightful howls and screams. (Their vocal renditions issue from small phonograph recordings in their throats, but the secret of how these voice-noises were figured out still lies locked in Messmore's brain.)

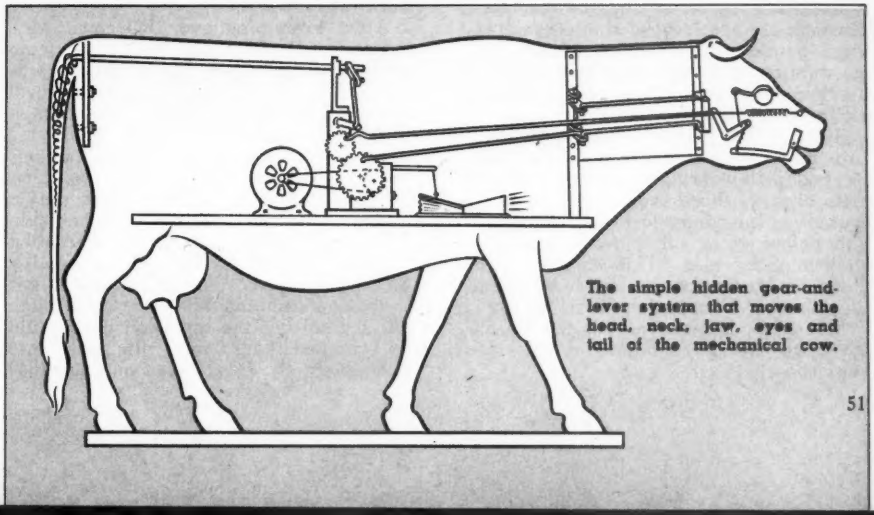
Though he started his peculiar business in 1918 with a partner, Joe Damon, since retired, the firm of Messmore and Damon didn't attain its world-wide fame until 1933, when they put on their spectacular exhibit, "The World a Million Years Ago," at the Chicago Century of Progress Exposition. That exhibit, which drew thousands of spectators from the far corners of the earth, was one of the great box-office bonanzas of the Fair. Visitors who entered the huge metal globe of the world, which housed the exhibit, were treated to a tour through steaming prehistoric jungles alive with such kicking, squirming, roaring and tail-lashing monsters as brontosauri, allosauri, ichthyosauri, stegosauri and dimetrodons. The brontosaurus, a 60-foot mechanized reproduction of its extinct counterpart, could move its long neck in any direction and even pick hats off unsuspecting spectators' heads. Its movements were activated by 17 motors, guided by a man who manipulated a push-button control panel from a secret recess inside.

A modern figure, "Horsepower." Messmore checks its coordination in the gallop.

Prehistoric plug-ugly! A fearsome gorilla of the past as recreated by the arts of today.

"That exhibit sure put us on the map," reminisces Messmore. "We were always cooking up new gags to publicize it." One of those gags resulted in so much world-wide publicity that Messmore had to stop his clipping agency from sending him any more newspaper clippings about it.

"It was breaking me to pay for all those clippings," explains Messmore. "You see, during the Fair, the exhibit was forced to move to a less desirable location and it needed a shot in the arm; so we changed its name to 'Down the Lost River' and hired a couple of nudists to go through a wedding ceremony in it. The bride was a Milwaukee gal and the groom came from Texas and all the members of the wedding party were as naked as jaybirds, except the minister, who wore a dignified goatskin. Reporters, feature writers and press and newsreel photographers really did a job on that ceremony, but so did a mechanic who accidentally threw the wrong switch and started up a tyrannosaurus and glyptodon. In the excitement a nudist and one of the bridesmaids fell backwards into the flotsam of the Lost River."



The simple hidden gear-and-lever system that moves the head, neck, jaw, eyes and tail of the mechanical cow.

The Iron Boots, in the mechanized "Torture Chamber." That's "molten lead" being poured.

Turning from the primeval to the medieval, Messmore took over the Show Boat and set up another mechanized exhibit called "The Torture Chamber," where he entertained his customers with such delicate scenes as screaming and groaning men and women being broken on the rack, getting boiled in oil, having their feet seared with red-hot irons or cooked in iron boots filled with molten lead. These exhibits consisted of life-sized, mechanized men with settings, costumes and torture methods accurately reproducing those of the middle ages. Through cleverly recorded and synchronized sound effects, visitors heard the questioning of the inquisitor as well as the screams and groans of the unfortunate victims.

High spot of this exhibit, however, was Ann Kay, "The Crusader's Bride," who stepped forth wearing a medieval chastity belt, one of those iron panties which crusading husbands locked their wives into before going off to war. Ann Kay wore nothing else. This soon brought down on Messmore the wrath of official World's Fair Censor Joe Moriarity.

"See here, Messmore," he cried, "you cover up that girl's bosom or I'll close your show!"

"O. K.," said Messmore. "Will any opaque covering do?"

"Yes," replied Moriarity, "but it's got to be opaque."

That night Messmore put his ingenuity to work. He made a plaster cast of Miss Kay's bust, poured some flesh-colored latex into the mold and made a paper-thin, thoroughly form-fitting bra which, when donned, powdered and retouched with rouge, couldn't be spotted from two inches away.

"Moriarity sure was mad," laughs Messmore, "but he couldn't do a thing. The bra was opaque. People offered me thousands for that formula but we never gave out the secret."

Though Ann Kay and her cast iron device drew large crowds to the exhibit, Messmore's press agent for some reason couldn't get the papers to mention the chastity belt.

"It's no use," he told Messmore one night, "the papers won't touch it. I've tried everything."

"That's what you say," replied Messmore. "I'll bet you fifty bucks I can get it mentioned."

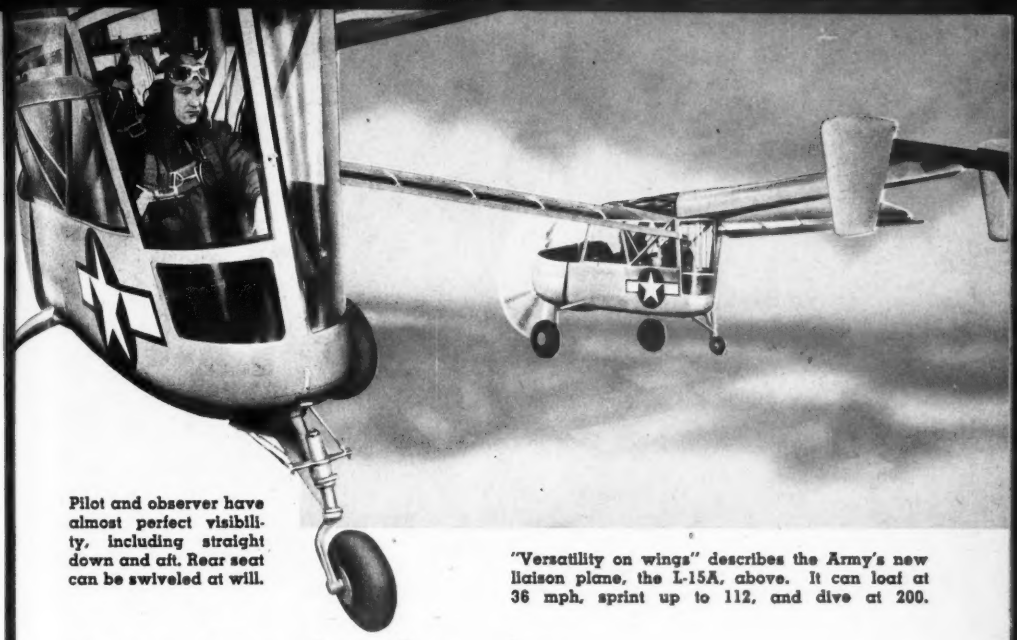
"It's a bet!" answered the P. A.

Messmore reached for the phone and called one of the local papers.

"I want to place an ad in the Lost and Found section," he said into the mouthpiece. "This is it: 'Lost: The key to the chastity belt. Liberal reward. Return to M. T. Show on Show Boat.'" Messmore won the bet.

In 1934, when International Harvester decided to demonstrate their McCormick-Deering milker at an exhibit, they turned to Messmore and Damon to produce a mechanical cow to which the milker could be attached. Nothing but a pure-bred blemish-free Holstein cow which could moo, switch its tail, turn its head, wink its eyes, chew its cud, breathe and give milk would do.

After examining over 150 cows, Mrs. Alken Ina Ormsby, No. 864,903, a bovine beauty of the finest qualifications, was selected. For weeks, she lived in regal splendor at the Messmore and Damon factory, eating the best of foods and living the life of Riley as she posed for her exact mechanical likeness. But when that likeness was finished, Mrs. Alken's days of luxury came to an end and her skin was used to cover the mechanical creation she had been model for. At the exhibit, Messmore hooked the mechanical milker to the cow, running a pipeline up through one leg so that the imitation milk could be pumped back from the pail into the udder [*Continued on page* 164]



Pilot and observer have almost perfect visibility, including straight down and aft. Rear seat can be swiveled at will.

"Versatility on wings" describes the Army's new liaison plane, the L-15A, above. It can loaf at 36 mph, sprint up to 112, and dive at 200.

new eye in the sky

THE Army's new observation plane, the Boeing L-15A, is the first plane designed specifically for battlefield observation and artillery spotting. Its importance is signalled by the fact that during the war even the use of Cubs and Grasshoppers—designed originally for ordinary citizens who liked to go flying on weekends—became so effective at locating enemy targets that from D-day on 75 per cent of all observation work for the big guns was done by these light personal planes. But a different type of plane had to be used for each job, and at the end of the war no one plane had been developed that would fit all requirements. To meet those needs, Boeing has turned out the all-purpose L-15A shown here.

This new "eye in the sky" is a two-place, all-metal monoplane powered by a single 125-hp Lycoming engine. With this low horsepower, the ship can produce an amazing set of performance statistics.

It can take off and clear a 50-foot obstacle, equivalent to a four-story building, in a distance of only 595 feet. It can come in over the same building, land, and roll to a full stop in 517 feet, and with no obstacle in the way it can land and stop in 247 feet.

Visibility, of course, was a prime consideration. In the L-15A, the pilot and observer have a sweeping, all-around view, including directly below the plane and directly aft. The observer's seat may be swiveled about so that he faces the rear.

The plane can remain aloft at speeds as low as 36 mph and it can jockey in for a landing at 32 mph.

Left: Full cantilever type tricycle gear permits rough landings. Wheels can be replaced with floats or skis.

Photos by Louis Hochman

Navy's Synthetic War

These amazing devices, simulating actual warfare, save millions of dollars in training our fighting personnel.

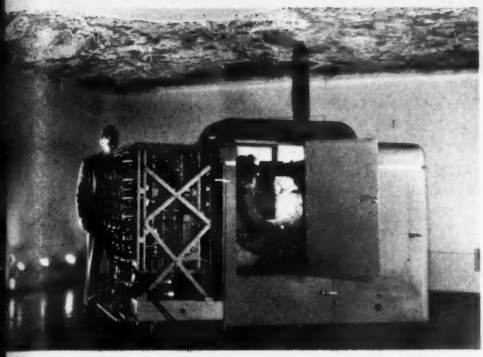
BY DON ROMERO

A BLOODLESS war is being waged at Sands Point, New York. Planes are roaring off landing strips, reconnaissance ships are scouting enemy terrain, radar-guided fighters and bombers are strafing and bombing enemy installations, and submarines are sinking enemy vessels. But let's go back a little.

In the early days of World War II, when the Navy was frantically wondering how it could speedily train raw recruits to operate the intricate machines of modern war, civilian inventor Luis De Florez announced he could solve the problem with "synthetics"—special devices by which men could be trained to operate the Navy's ships, planes, and guns under conditions simulating those of actual warfare. Skeptically, the Navy gave De Florez a technical staff and told him to go ahead. Today, almost two years after the end of the war, De Florez's "Special Devices Center" is not only still in existence but it is operating with a bigger staff than it ever had during hostilities.

Located at the 163-acre Daniel Guggenheim estate at Sands Point, Long Island, its 350 engineers and technicians, working in a building which formerly stabled the Guggenheim's riding horses, are now turning out bigger and better synthetics which are saving hundreds of lives and millions of dollars in the training of the Navy's fighting personnel.

One of the simplest yet most effective devices recently turned out is the Primary Flight Trainer. Over a stationary cockpit, equipped with a "stick," foot pedals, and



Left: There's a real sensation of flight when the student views this replica through the periscope at top. The scene which appears to be below the student is actually on the ceiling as shown in the above photo of the Contact Flight Trainer.

throttle, is a horizontal beam with a counterbalanced model plane dangling from one end, a few feet in front of the student. By means of the cockpit's controls, the student can regulate the speed of the model's propeller, and also manipulate its ailerons, elevators, and rudder. Under the model is a canvas endless belt simulating a landing strip.

In a take-off, this belt is set to revolving under the model's wheels and the student, seeing the "landing strip" rush toward him as it would in an actual take-off, has the problem of getting the model smoothly into the air. Once he is "up," he puts the model through climbs, dives, and banks in response to his instructor's commands. Being delicately counterbalanced, the model is so dependent for flight upon the actual pull of its propeller that should the student use insufficient power, the model can actually "stall out" in a steep climb, or "side slip" in a sharp bank. When he brings the ship in for a landing, the belt is again made to revolve, and the student is required to put the ship down without "nosing over" or toppling over on one wing.

A similar, but considerably more complicated synthetic is the Contact Flight Trainer, an electro - mechanical - optical device which in addition to training novice flyers can be used to familiarize trained flyers with actual terrain.

The trainer consists of an enclosed, wheel-mounted cockpit which rolls over a perfectly level steel floor. On the ceiling overhead is a colored relief map, accurately scaled one foot to the nautical mile, and reproducing a large section of terrain. Inside the cockpit is a "stick," throttle, dashboard, and machine-gun button. Protruding from the top of the cockpit is a periscope which is aimed straight at the ceiling, and which can be raised, lowered, or revolved 360 degrees. At the bottom of the periscope are eyepieces through which the student peers while flying his "ship."

In putting the ship into flight, what the student actually does is to send the cockpit rolling forward, so that when he looks at the relief map through the periscope, he gets the illusion of actually flying. His "altitude," of course, is determined by the distance of the periscope's "eye" from the ceiling.

If he goes into a dive, the student suddenly sees the ground rushing up toward him, the illusion being created by the periscope automatically rising toward the ceiling. If he goes into a climb, he sees the ground recede, the illusion being created by the periscope receding from the ceiling. If he banks right or left, or even goes completely over on his back, the periscope makes the necessary illusionary accommodation so that optically the student always gets the impression of being in whatever position he has set his controls for.

The realism of flying, however, isn't confined merely to the optical. When he speeds up his prop, the engine's roar grows louder. When he presses his firing button, he hears the bark of his machine guns. And when

Below: In the Sub Attack Trainer, a student seeks out and attacks an enemy "tin fish" controlled by the instructors. The periscope is the real thing.

he goes into a climb, his controls become harder to work. In fact, so realistic is the entire illusion of flying that students practicing on the trainer have at times been known to become airsick. One of the invaluable features of the trainer, especially in time of war, is that from aerial photographs, technicians can create and install a contour map of enemy terrain in a matter of hours.

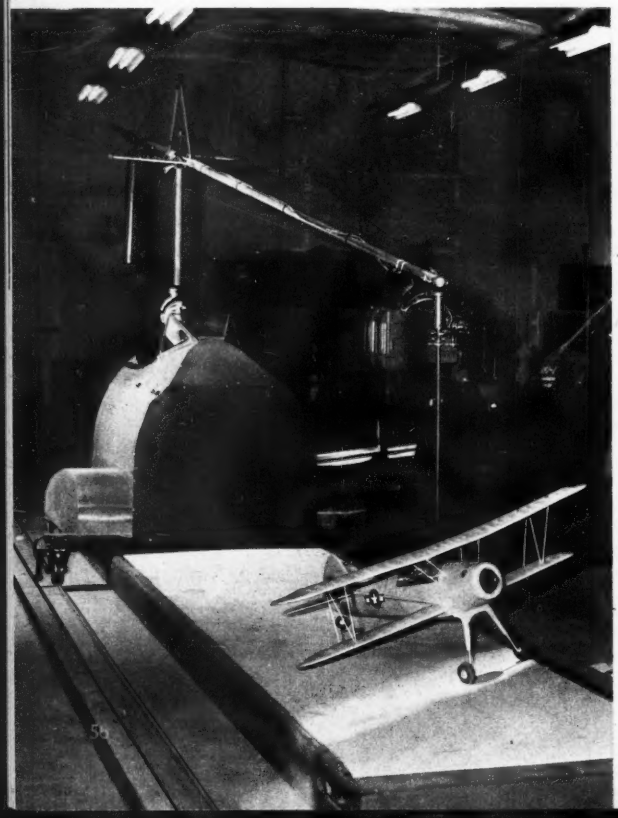
An entirely different type of synthetic is the Loran trainer, which is used for instructing seamen and pilots in making long-range navigation computations from radio signals. Most of the world's ocean surface is divided into four sections, each of which is serviced by eight pairs of Loran radio stations.

When a navigator, seeking to establish his position, gets a signal from one pair of stations, he uses an oscilloscope for converting this signal into a reading in microseconds. On his Loran map he then finds a long curved line bearing this same microsecond reading. Getting another signal from a second pair of stations, and again converting it into a microsecond reading, he finds another curved line on his map bearing this second reading. All he has to do then is to note where the two lines cross and he has his navigational position.

However, to train navigators in the very tricky business of making accurate readings from their scopes, engineers have developed a synthetic which reduces thousands of square miles of open sea to a map about 15 by 6 feet square and which for purposes of accuracy employs high-frequency-sound signals, which travel at only 1,087 feet-per-second, in place of radio signals, which travel at 186,000 miles-per-second.

Using a small sound receiver to denote a ship or plane, and four small sound generators to denote two pairs of Loran radio stations, the instructor moves the receiver to any point on the map and then begins to bombard it with sound signals. Upon being picked up by the receiver, these signals are instantly converted into electrical impulses so as to appear as microsecond readings in the student's scope. From these readings, the student is required to quickly determine the position of his ship or plane, his answer being easily checked by the instructor who merely has to note where the receiver actually lies on the ocean map.

A somewhat similar synthetic, designed to train pilots in the use of radar is the Ultrasonic Radar Trainer. As in the Loran device, this instrument employs high-frequency sound which, however, is sent through water so that it will move only 1/200,000ths as fast as radar waves move through air. The trainer consists mainly of a comparatively small scale relief map, which is covered with six inches of water in which the sound generator, denoting the plane, is completely immersed. In radar, the transmitting antenna on a plane revolves once every six seconds and constantly sends out a beam in a three-degree arc. The sound generator does the same thing, except that it sends out a beam of sound rather than one of electricity. Also in radar the pilot uses a scope in which an arm of light revolves in simulation of the revolving radar beam which the plane is sending out. When this beam picks [*Continued on page* 79]



Left: With the simulated controls, trainee attempts to land the plane on the moving belt in front of him.

The Flying Flapjack

BY GILBERT PAUST

Photos by Rudy Arnold

It looks like an aviator's nightmare, but this Navy job is the fastest - and slowest - plane in the air.

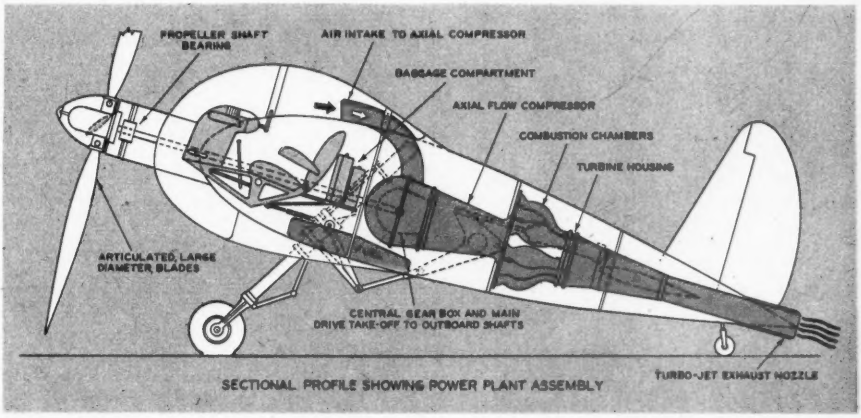
THE Navy has a flying Flapjack, and brother—it can fly!

It all began on a day in November, 1942, when the doors of the Vought hangar opened and test engineers trundled out a queer, saucer-shaped object on two long, stilted legs—and claimed it was an airplane. The V-173, they called it, and gave credit for its design to an aeronautical engineer who had been active in NACA research and had recently joined the staff of Chance Vought: Charles H. Zimmerman.

The test pilot, Boone Guyton, climbed the ladder that led to the small door under the nose, and entered the pilot's nacelle. The two huge, three-bladed propellers, protruding from the sides and looking more like helicopter rotors mounted vertically than conventional "props," started turning. With its nose pointing into the sky at a steep angle, the Flapjack flew.

Not much has been told about that first flight. The plane's first performance did not cause a great sensation among the

Tomorrow's Flapjack will be equipped with a gas turbine and jet assist, making higher speeds possible.



SECTIONAL PROFILE SHOWING POWER PLANT ASSEMBLY

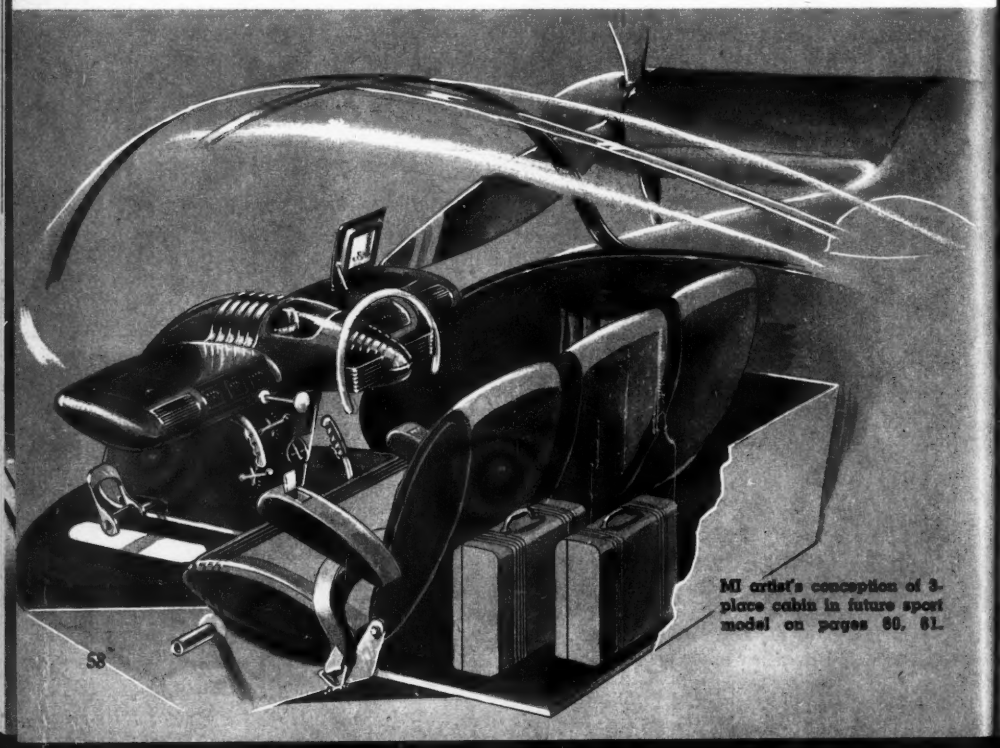
The V-173 is entered through a hatch below the pilot's cabin. Excellent visibility is provided through nose.

The XF5U-1 has retractable gear and is powered by two 1800-hp. engines. It is metal covered and uses four-bladed propellers, although its plan-form is the V-173.

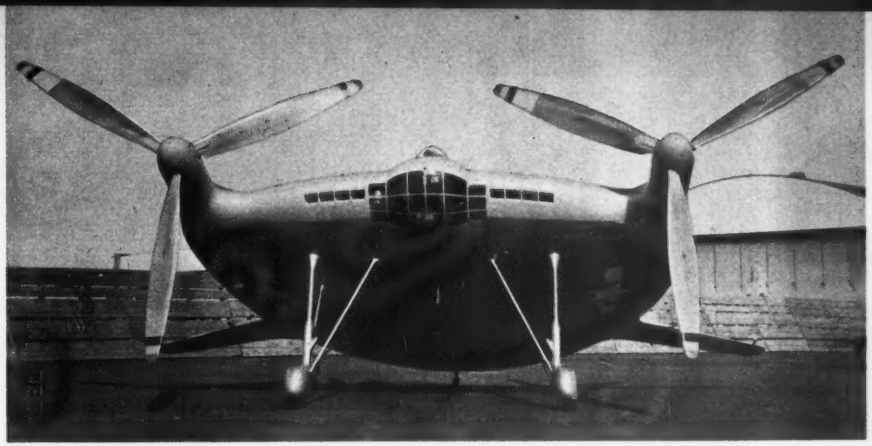
press at that time. The world was at war and there were many more important events happening in the skies to take the headlines. This new "crate" was just a bad dream, too radical a departure in aircraft design to be taken seriously. Even military censorship didn't know exactly how to handle it. Photographers shot some pictures; these were published and soon forgotten.

A couple of years later a new, slicked-up model was announced, bearing the Navy insignia and the designation XF5U-1. Nothing much was said about it. No mention of a test-flight was made. A couple of "hangar" pictures found their way into the newspapers and then the Flapjack faded from view, quickly smothered by warfront news.

The Flapjack wasn't scrapped; *it is po-*



MI artist's conception of 3-place cabin in future sport model on pages 60, 61.



High landing gear are necessary to hold propellers clear of ground. Airflow covers wing and tips.

tentially the world's most versatile airplane. All attempts to obtain information from its manufacturer and the Navy on its present status and performance have met with blunt refusals. The following facts have been gathered for you from reliable sources. Read them over and take your hat off to the slickest thing in the air!

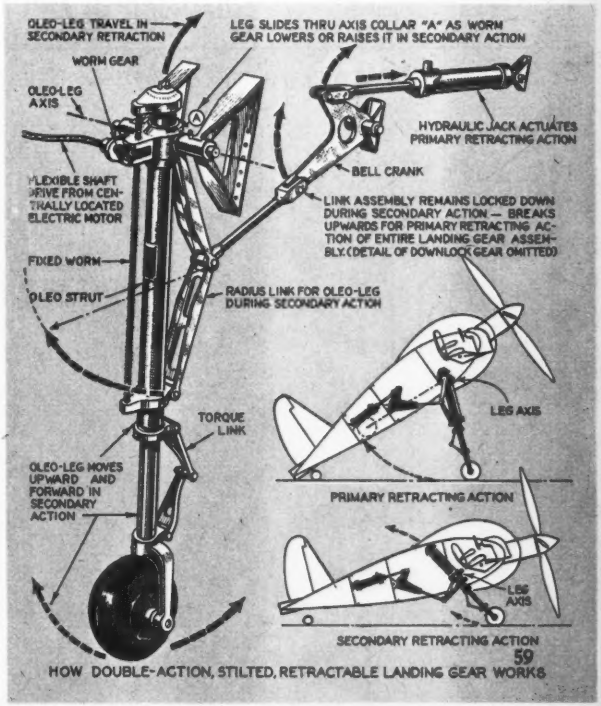
The basic wing plan of the plane is a circle designed as an airfoil to obtain lift from the air, at the same time serving as fuselage to house the pilot and engines. The large propellers are tractors, driven by fuselage engines with which they are connected by a gear-and-shaft arrangement. They turn at approximately ⅕ the speed of the engines. The propeller shafts project forward from the sides of the wing, positioning the propellers so that their airflow is continuous over the wing.

A conventional wing "stalls" (loses lift) when the airflow over its surface, caused by the travel of the wing through the air, is broken (burbles) at slow speed. In the Flapjack, however, since the airflow over the wing is not caused by its motion but by the propellers, the airflow remains unbroken and lift is maintained even at slow speed. Although the actual aspect ratio of the wing (span divided by width) is less than one, the effective aspect ratio is approximately four since the propellers rotate against the wing tips, maintaining flow here also and increasing the effective span of the wing.

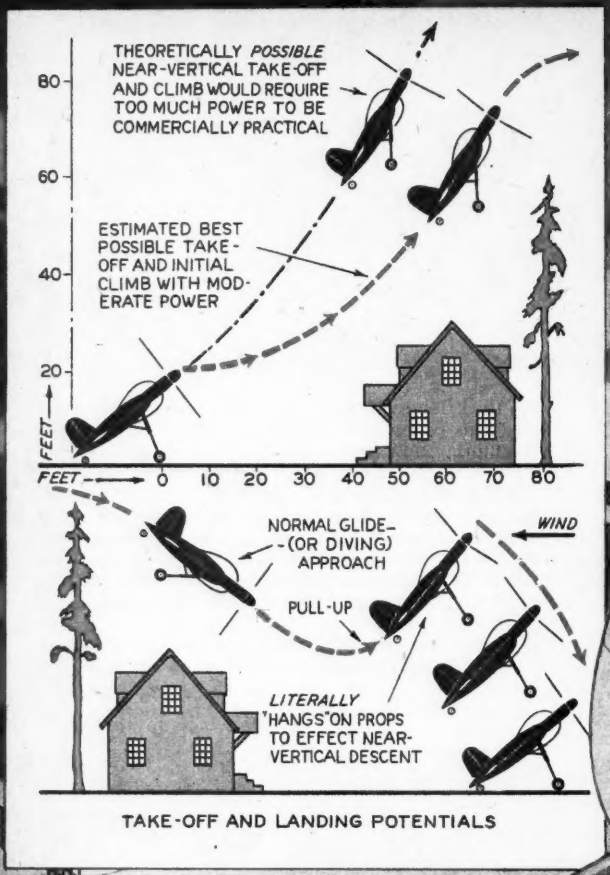
In a model utilizing a higher horsepower engine, such as a gas turbine, to turn the propellers, it is possible for the wing to point its nose straight upward into the sky and hover like a helicopter. Articulated blades, like those on a helicopter, maintain control for vertical ascent and descent. What a plane for a backyard airport!

The vertical control surfaces of the plane consist of twin fins and rudders, [*Continued on page* 79]

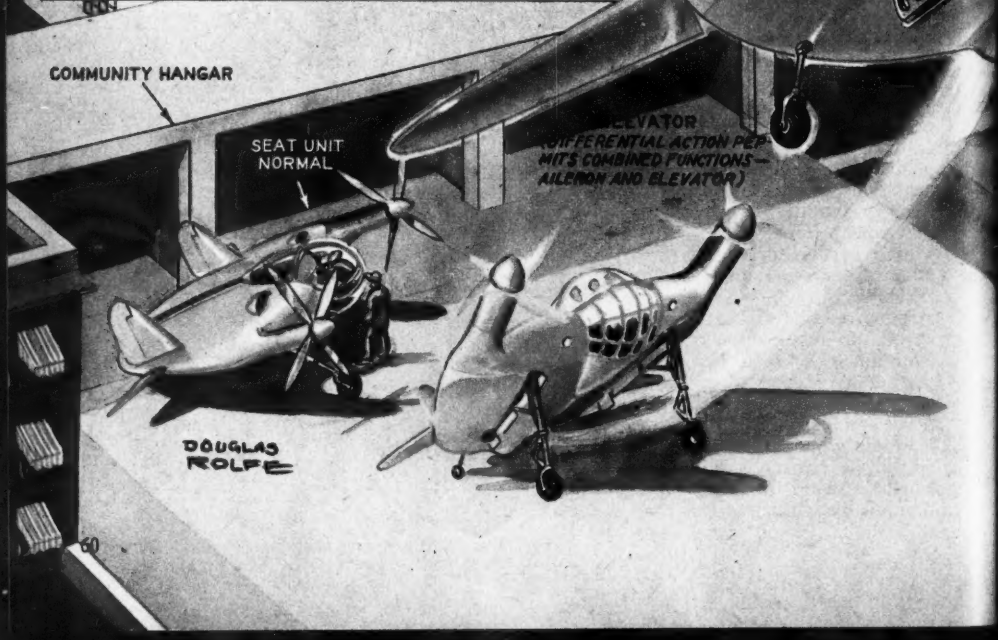
Drawings on next page



HOW DOUBLE-ACTION, STILTED, RETRACTABLE LANDING GEAR WORKS



TAKE-OFF AND LANDING POTENTIALS



The slow-fast flight characteristics of the Flapjack make it an ideal design for a sportplane. With extending, retractable landing gear (as shown on previous page), this 3-place model, designed by an MI artist, could operate from small fields only slightly larger than an ordinary backyard. At right is the V-173 in flight.

They talked me down!

Major George A. Miller, below at right, talks with the ground crew during a GCA approach.

EVERY once in a while I get an assignment that turns out to be quite a bit different from what I'd expected. I just had one of those. The article was to be on what it feels like to make a landing on GCA (Ground Control Approach). This is the system in which the aircraft is spotted and tracked by radar and directed to a landing "sight-unseen" by a five-man crew shut up in a movable trailer parked along the runway. That's where they get that "ground control" part of the name.

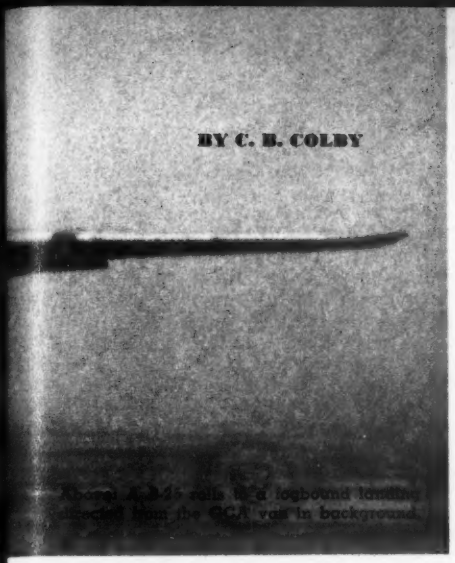
Out at Mitchel Field on Long Island the AAF, with their usual fine cooperation, turned a Douglas C-47 and crew over to MECHANIX ILLUSTRATED for the test. John Blecha, our photographer, and myself climbed aboard "Army 7283" with the crew. The pilots were Majors John W. Chapman and George A. Miller. Captain George A. Accas, PRO for the Air Defense Command, also went along plus the plane's crew of "non-coms."

The GCA unit included Captain John J. Felingeri, Lieut. William E. Harris, M/Sgt. Boslet, T/Sgt. Bauerle, M/Sgt. Breisacher and T/Sgt. Crabtree. And I'll match that gang of GCA "salesmen" against any in the business. Later you'll see why.

It was to be a short simple demonstration. Sort of a "round the pattern and back to bed" affair, with a minimum of bother to all. The field was on "instruments" but it was still pretty good down on the deck—about three miles visibility with a 700-foot ceiling and not much wind. Army 7283 got cleared for takeoff and climbed up on top into the sunlight. We broke out around 1,500 and kept right on to 3,000 where we leveled off and waited for the GCA boys to bring us home. The sun was warm and the "floor" of clouds stretched as far as the eye could see in every direction.

My radio headset crackled into life and a voice said: "Mitchel Collect calling Army 7283—" and went on to ask for a description of the aircraft, our heading, altitude and other data. "Mitchel Collect" is a radio direction finder outfit that works with the GCA crew to complete the landings. All communications were on VHF (Very High Frequency) and were remarkably clear and static free, in itself a great help to safety.

Major Miller acting as co-pilot for the time being crisply gave "Mitchel Collect" the information. After a pause "Collect" requested that we make a 300-degree turn to the right to positively identify our aircraft while they obtained a radio "fix" upon us with their direction finder. The cloud horizon promptly tilted up and we



BY C. B. COLBY

Colby tries out the Army's GCA system of landing in the fog—and gets some unexpected chills.

swept around the compass in the identification turn, and leveled off on the new heading. "Collect," after a moment, requested a "long count for a steer" from our radio while they took another accurate bearing.

Major Miller obliged with a slow count from one to ten and back again. Another pause and then we were directed to head on a magnetic course of 193 degrees. After a few more requests for "long counts for a steer" and the resulting new headings, "Collect" reported: "You have just passed over the field. We are turning you over to GCA for further landing instructions."

We had been tracked down by radio, directed unerringly to pass directly over the field invisible to us below, and had now been turned over to GCA for the last act—being brought down through the overcast to the very runway itself by men watching only a tiny spot of light (us) wandering about a set of dimly lighted radar scope screens.

A new voice came on the radio: "This is your GCA Plane Selector speaking. We have you clearly in sight. You are coming in perfectly on our screen. Continue on present heading until further directed."

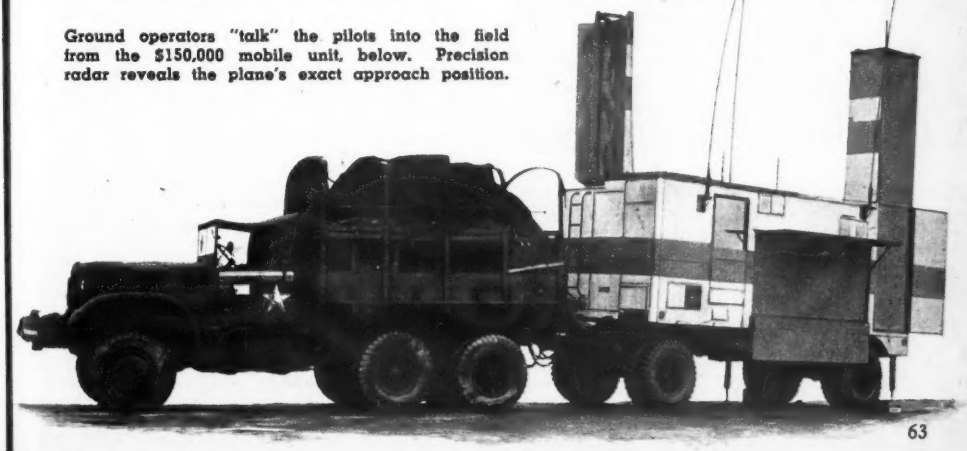
"Roger," Army 283 replied (for brevity only the last three digits are used in radio conversation). After all, GCA is the boss from here on in.

"Plane Selector" following our image on his radar scope screen began to direct us around a rectangular course that would eventually bring us to the runway, giving us continuous headings, and altitudes to follow and fly. We heeded orders and read back all instructions as we maneuvered above the overcast. We made a right angle turn to the left and were informed we should be on the crosswind leg flying at 1700 feet and heading zero nine zero. We were.

After a moment or two we were directed to make another left right-angle turn and descend to 1500 feet. "Plane Selector" now turned us over to "Traffic Director," another voice, who informed us that our landing gear should be down and locked and our landing cockpit check completed. "Roger!"—and Major Chapman, the pilot, shucked off his fur collared flying jacket.

We droned along over the fleecy floor below, flying the new heading and read-

Ground operators "talk" the pilots into the field from the $150,000 mobile unit, below. Precision radar reveals the plane's exact approach position.



ing back the corrected headings as we got them. We held altitude perfectly and also the course but learned from GCA that there was a tremendous cross wind on the ground—and gusts. Hmm!

GCA directed us to make another left turn into the base leg of the pattern and descend to 1200 feet maintaining the new heading. A moment later we learned we had been cleared to land, that we were right on course, coming in nicely and were about to be turned over to the final voice known as "Final Director" for the actual approach and landing.

Right here and now I want to comment on these various voices. Whoever picked them knew his voices as well as his vocations for I have never heard voices over a headset so reeking with confidence, assurance, and sedative qualities as those of the GCA gang at Mitchel Field. I swear that "Final Director" (T/Sgt. Bauerle) could coax you to fly blindfolded through a hangar with the doors shut—and you'd make it.

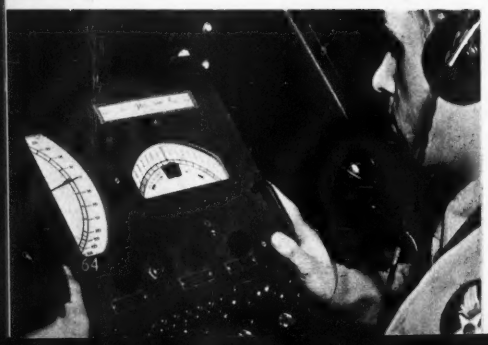
Army 283 made the last left turn and started down on direction to 1000 feet. This was the business, not a staged demonstration with the cockpit curtained to make it appear zero-zero. It WAS instrument weather all the way down. From here on in it was to be the exacting matter of Majors Chapman and Miller doing exactly, and I mean *exactly*, what that voice said. You almost felt that Final Director was peering over your shoulder all the way down. He held us rigidly to headings, altitudes and speeds, lining us up with the center of the runway, not just the field, or even the runway, but that dog-goned center crack in the concrete eight miles away. Brother!

With our gyros checked with the magnetic compass we began to slide down the invisible parkway that showed as a fine slanting green line on the scope before the Final Director. This instrument, checked against another radar report giving GCA our position in relation to the center line of the runway, enabled him to steer us right down the "middle aisle" and at a rate of descent calculated to put us right where we belonged when we broke out of the ceiling over the field. Needle equipped "errormeters" gave him the distance above or below or to either side of this straight and narrow path to the runway. If we were off—ten feet, twenty feet, or whatever it was, he knew it instantly.

If the little dot of light that was "us" dropped below that slanting green line of our correct "glide path" we heard about it fast, and the same thing happened if we didn't follow it down steeply enough. A curt "increase your rate of descent and hold it" does the trick. If we wandered to the left or right of that center crack we heard about it pronto, and definitely. Oh, they are polite about it but oh so positive. (It must be wonderful to tell a Major where to go—legally.)

I'll never forget that voice as we sank down through [*Continued on page* 90]

Photos by Rudy Arnold

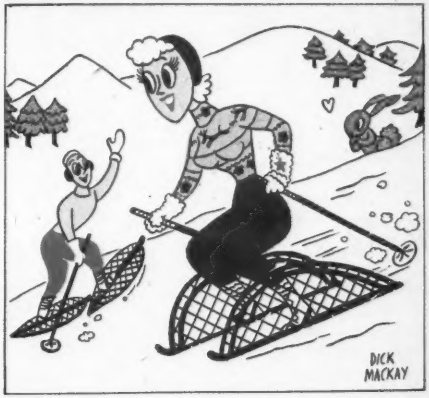


Top: The fate of the plane up there in the fog rests with this five-man crew in the GCA van. Center: M/Sgt. Boslet wearing lip mike watches the Plane Position Indicator and brings the ship into final landing pattern. Left: T/Sgt. Bauerle checks the glide with Errormeter.

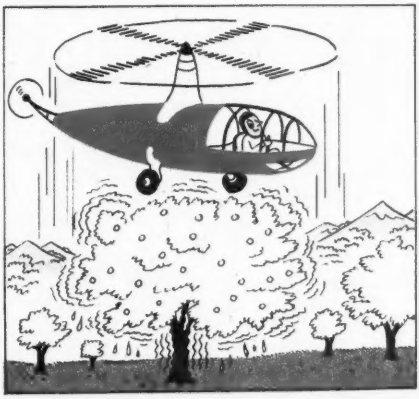
MI LOOKS AHEAD

WITH LOUIS WOLFE

Ski-Snowshoe combination permits the snow traveler to walk over the surface of deep heavy snow fields and to coast ski-fashion when he comes to a good downhill slope. To change from snowshoe to ski, all you do is raise the longitudinal halves that are attached by hinges and away you go. This product is the brainchild of Joseph A. Arsenault, Mexico, Maine.

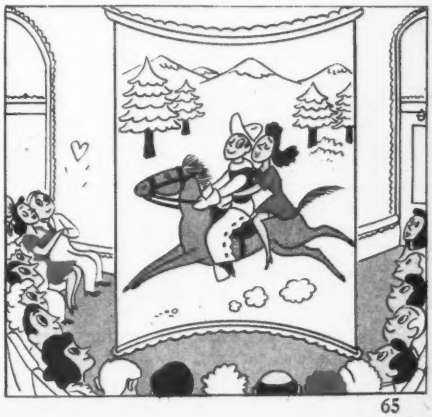


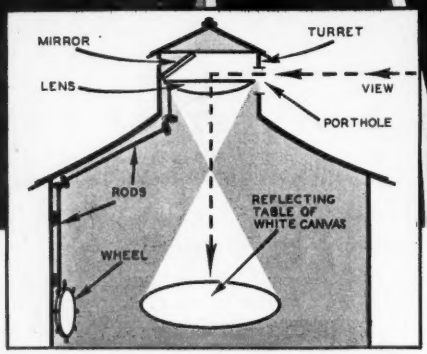
Hearing Aid-Radio, worn by the gentleman at the left, is another unique and practical combination. A vestpocket radio receiving set is attached to the hearing aid batteries and uses the ear phones as speakers. The handicapped husband can, if he desires, turn off his wife's conversation and tune in his favorite broadcast.



Curved Movie Screen, concave in shape, eliminates distortion and enables you to see with comfort whether you sit way down in front, far off to the side or high up in the balcony. The screen is made of fireproof Fiberglas laced to a curved steel frame and is a development of the Advance Research Corporation.

Cherry Tree Shaker is the occupation of the man in the helicopter. The Department of Agriculture, Beltsville Station, Maryland, is actually using this means to shake the moisture from ripening fruit. If the moisture left by a rain at harvest time is allowed to remain, the cherry skins split open and top market prices are lost.





PERISCOPE HOUSE

YOU walk across the green-lawned, palm-hemmed park overlooking the Pacific Ocean in Santa Monica, California, and climb the stairs to the little house in the picture above. Your party gathers around a circular rail in the center, the door is closed and at first all is darkness.

Then, slowly and as if by magic, the scene you left outdoors a few minutes before appears on the revolvable table in front of you. Colors are perfectly natural. Strollers in the park move about, quite oblivious to their observers.

The venerable operator, E. V. Williams, turns a wheel and the outdoor vista is duplicated in first one direction, then another. East, you see Santa Monica's Broadway, with snow-capped mountains in the far background; to the south and west is Ocean Park amusement center, Catalina Island and the Pacific Ocean; and to the north is Palisades Park and Ocean Avenue.

These scenes enter through the small hole you see in the cupola atop the "periscope house." The image is reflected by a mirror down through a lens and onto the tilting circular table. This apparatus, called the Camera Obscura, is actually an adaptation of the periscope.

The novel showplace is maintained by the Santa Monica Recreation Department and has been entertaining visitors for more than 40 years. Downstairs, members of the Chess and Checker Club— "old duffers," Williams calls them—meet to test their skill and to argue topics of the day.

A few years ago, Williams recalls, the Camera Obscura was a thief's undoing. Just as the lens turned to pick up a view to the north, it focused on a muscular

youth stealthily approaching a woman asleep on the grass in the park. The audience, gasping at the image before them, saw the young athlete steal the sleeper's purse and sneak away to rifle its contents.

Williams hastily summoned an officer who apprehended the thief with the money, watch and other valuables from the purse still in his possession. The purse had disappeared down a storm sewer. The victim went into hysterics—and back to her home in Philadelphia with a hearty regard for the Camera Obscura.

The Camera was built by John P. Jones, who received an inspiration for its construction while abroad. And only recently a world traveler took down construction details of the Santa Monica attraction with the idea of building a similar structure in Europe.

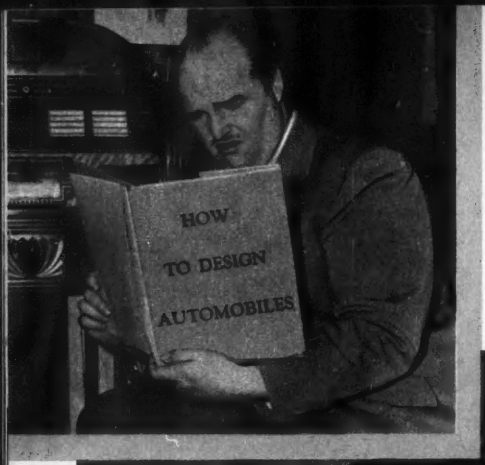
Williams, a bachelor who guards his age with a spinster's vigilance, is "only temporary" on the job, he says. He's been at it 13 years. His real interest is the Chess and Checker Club downstairs, but he never minds leaving a close game in order to demonstrate the Camera. •

Photos by Jack Birns, Graphic House

The helm-like wheel operates the rods and helical gears which turn the mirror and lens, permitting a view in any direction.

As shown in the diagram on opposite page, the image enters porthole in the revolvable cupola, and is reflected by a mirror through the lens.

The outdoor scene—in natural color—is duplicated on the convex table. Once a thief was observed snatching a woman's purse and was caught.



MI tests the '47 cars

Front of the new Chevrolet features a striking radiator grill with massive horizontal members and rectangular parking lamps mounted between the ends of the lower bars.

Tom McCahill, MI's auto expert, gives the lowdown on the '47 Nash, Pontiac, Oldsmobile, Buick and Chevrolet.

THE Studebaker and jeep station wagon have already been reported on, but the rest of the '47 cars introduced thus far are so similar to the '46's that we feel a test on each would be a waste of paper.

I wish I could bring you exciting reports about new engines, bodies, brakes and a hundred other things, but there are a number of good reasons for not changing models at this time, and I agree with the manufacturers that it would be foolish to switch while there is still a backlog of orders running into the millions.

In the General Motors line there have been a few alterations of minor importance, but they are token changes and nothing more. One, which seems to be universal practice, is the business of redesigning the front grill and hood ornaments and calling the car a new model. In '46 every postwar car manufactured featured a new and massive front grill

New Buick sedan with "silent zone" body mounting and "functional" style.

and bumpers, and this, my friend, with the exception of the Studebaker, represented just about all the postwar advances. What do we get this year? More bumpers and gaudy grill designs. I swear I think the same guy who designs juke boxes is now designing most of our automobiles. Every time I see one of these blatant front ends, I unconsciously look for the spot to put the nickel in so it can start playing the Donkey Serenade.

Seriously, I would like to know whether it's the taste of the American buyer that demands these cheap-looking assemblies or the companies' conception of his taste. To prove quickly that all this gaudy chrome doesn't make sense, much less good looks, take the Lincoln Continental. If you asked any ten of your friends what is the best-looking car made in America, nine out of ten would most likely name that car. The Lincoln Continental gets its beauty from simplicity of design and nothing else.

In Los Angeles there is a shop that specializes in taking a car just like yours, or my own '46, and *removing* all the chrome monstrosities. All the shiny bands from fenders, back deck and hood are removed, and the holes plugged up and then painted over. It costs about fifty dollars but makes the cars look a thousand dollars better.

Front-seat view of the new Nash showing the utility, comfort and smart styling.

All this leads to the oft-repeated question: When are they going to bring out a really new model? The answer for the majority of cars is: Just as soon as sales resistance starts, and not before. A year ago any car with four wheels and an engine would be grabbed up by a car-starved public before it was unloaded from the freight train. Today, from checks I have personally made on various parkways, the '46 and '47 cars actually amount to about 22 percent. No one can say what percentage would be new cars if there were plenty available. Experts I have spoken to feel that, barring strikes, you may be able to buy any car of your choice on a ten-day order by next Christmas. The New York market already has plenty of '46 used cars to offer. The prices may be ridiculously high, but this shows a trend; there are cars available; and when sales resistance to new cars reaches a certain point the really new models will come out.

CHEVROLET. The '47 Chevrolet, like the '46 and '42, will undoubtedly remain one of America's top cars from the standpoint of popularity. Its chassis remains basically unchanged and it has the same valve-in-head, 90-hp engine. The dependability of the Chevrolet is beyond question. It is rugged and tough and no car offers a better buy per dollar invested. Of course, there are people, myself among them, who prefer some of the features on competitive cars, features that are not Chevrolet specialties. The interior room of the Chevrolet is in my opinion a bit scarce and not in keeping with the trend for wider and roomier bodies. The riding quality is excellent for a small car. The top cruising speed is not a standout feature, but this is not important to a great majority of American drivers. It's ideal for shopping, taking the kids to school, and hundreds of neighborhood chores. It is also tops in mountainous country, for it

will climb the toughest grade like a scared rabbit, leaving many more powerful cars in its wake. For business men who put thousands of miles on a car in a year and can't afford any lay-ups for repairs, the Chevrolet is again tops, as 50,000 miles without anything more than a valve adjustment and spark plug service is common with these great little cars.

The Chevrolet is comparatively a high-speed affair with an engine that turns up over 3,000 rpm's at 60 mph—which accounts for its great flexibility and hill-climbing prowess. Compare this to its nearest competitor which turns less than 2,500 rpm's at 60 with an engine of ten more hp and you will quickly understand that the competitor is much better suited to long-distance, high-speed travel. The principal difference is in the gear ratio. This difference means the Chevrolet is by far the peppier car at speeds up to 40 or 50 but after that it starts to fall off and the competitor takes over the rest of the way.

The following small changes are about the only differences between this and last year's cars. The body interiors have been changed little. The steering wheel and horn button cap have been changed and the colors of the instrument panel are different. The biggest change is the new one-piece radio grill. Outside, except for the radiator grill, most of the '46 chrome has been eliminated. This is a great improvement in looks and a step in the right direction—though it may have been caused by the shortage of chrome. Mechanically the only changes are a new type water-pump seal, different rubber power-plant and transmission supports and the use of a self-lubricating powdered metal clutch pilot bearing, instead of the former roller bearing.

BUICK. If you want to know how the '47 Buicks are, ask the man who owns a

Pontiac offers the same models as in '46, but with new front-end styling.

The '47 Nash has been redesigned to give added front-end massiveness and long, lower appearance.

to high-speed, long-distance travel you'll have to look a long time to find a faster or more able American car than the 70 Roadmaster. I've seen these cars going across the plains of Texas and New Mexico at speeds of 70 or 80 with no more effort than it takes to do 60 in some cars. Frankly, I don't believe there is a better car built in America for long, hard travel than the big Buick. Buick is again offering three models: the series 70 Roadmaster with a 129-in. wheelbase, the series 50 Super, 124-in. wheelbase and the 40 Special, 121-in. wheelbase. The chassis of all three are basically unchanged.

OLDSMOBILE. Believe it or not, the '47 Oldsmobile has a new front hood ornament. It also has some new fender ornaments. And the interior front door trim has been redesigned. And so on. But Oldsmobile dedicated a great percentage of their '46 cars equipped with hydra-matic shift to disabled war veterans and for this they deserve a fine salute. The hydra-matic has been discussed at length on these pages before. For myself, I am not an automatic clutch fan. I still think I can get a lot more out of a car by shifting myself. From all the reports I can get, however, practically all cars will be gear-shifted automatically before another five years have passed, so, if you want to get a jump on the future, get a car with hydra-matic as this is the

Wide color choice but slight changes in design mark the new Oldsmobile.

'46—to borrow from Packard. The changes between this and last year's offerings are a new front-end design of massive appearance and a new grill design, period. The postwar Buick has proven itself one of America's top flight automobiles, however.

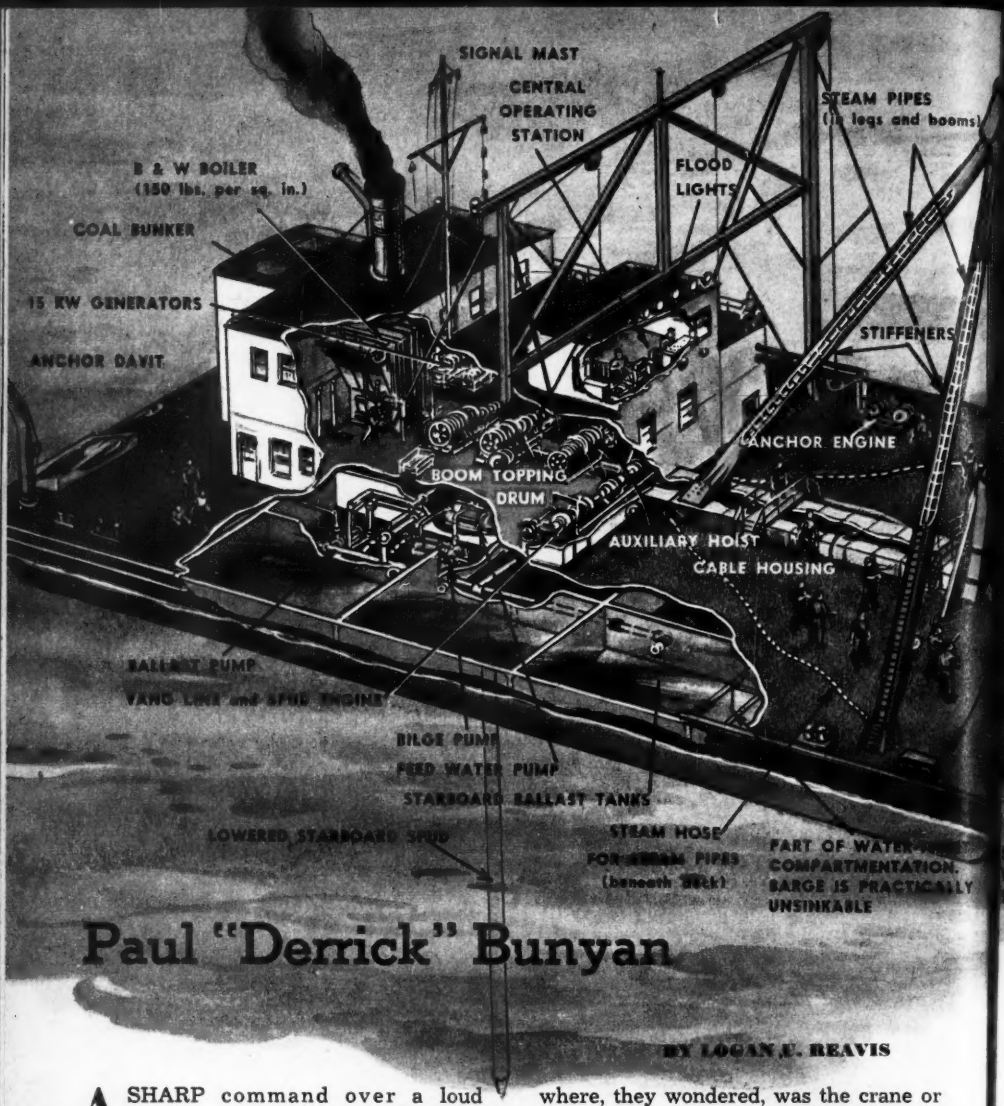
I've had a good chance, since I wrote my test on the '46's over a year ago, to study some of these cars on the road. When it comes

leading automatic shift. Four out of every five Oldsmobiles sold today are so equipped.

Looking over a list of the colors available on this year's Oldsmobiles is like seeing a sample chart from a necktie firm. Here are some of them: Havana Beige, Pawnee Beige, Nightshade Blue, Ivy Green, Chariot Red, Sea-foam Green. What, no Tickle Pink?

As we told you last year after its test, the Oldsmobile is a top-flight car, perhaps sometimes a bit on the gaudy side, but good transportation.

PONTIAC. The '47 [*Continued on page* 87]



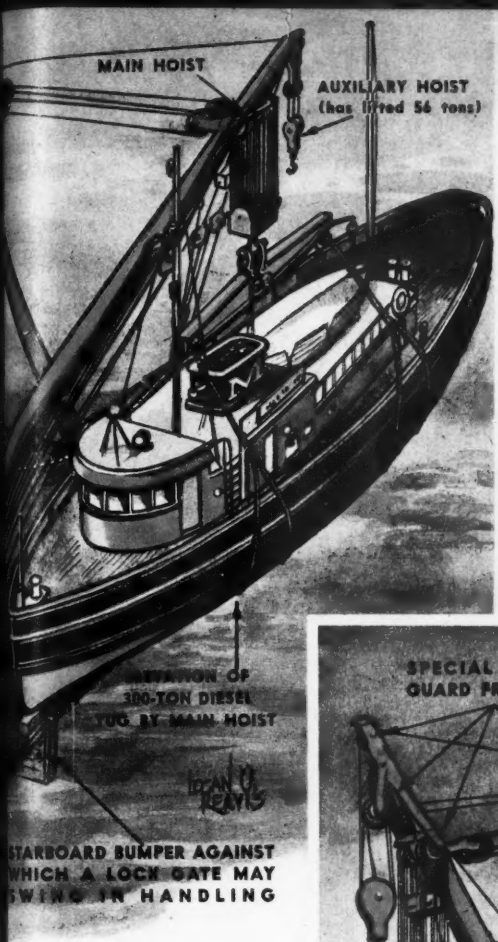
Paul "Derrick" Bunyan

BY LOGAN E. REAVIS

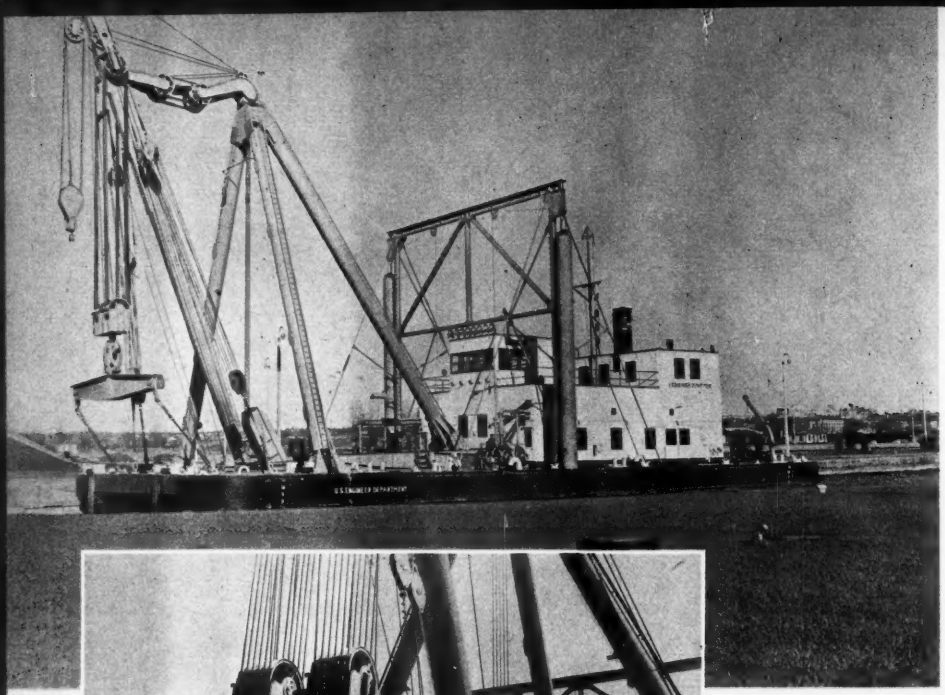
A SHARP command over a loud speaker, the sudden straining of steel cables over sheaves, and a giant arm slowly, steadily, lifts a tremendous weight higher and higher into the air. Paul Bunyan, legendary Hercules of the North Woods, "rides again"—his muscles the powerful drums and cables of the mighty floating derrick created by the Army's Corps of Engineers to serve the vital "Soo" locks, critical bottleneck connecting Lake Superior and Huron.

Engineers, eyeing the immense flow of essential war materiel through the St. Mary's Falls Canal, and fearing the bomb or collision that could block traffic, decided, in 1942, to add another lock. But where, they wondered, was the crane or floating derrick large enough to handle one of the massive lock gates? They began to sketch, draughtsmen labored over drawing tables, until at last Paul Bunyan, one of the world's greatest floating derricks, grew to manhood at Muskegon, Michigan.

A lift of 250 tons at three feet a minute was specified. Did Paul do it? Look! They hooked on a test weight of 312 tons. Mr. Bunyan took one look at it, smiled, braced his 34-inch-thick legs, raised his powerful 42-inch arm, and swung the heavy mass into the air at the rate of seven feet per minute! At three-quarters throttle! And held it there all night!



PRINCIPLE OF STABILIZING BARGE WITH THE BALLAST TANKS WHEN BOOM SWINGS WEIGHT OFF CENTER. HERE WEIGHT SWINGS TO STARBOARD AND WATER BALLAST IS PUMPED TO PORT SIDE



Submerged wreck? Here are the muscles to lift and move it away.

Closeup of load block. The giant hook and nut alone weigh 2½ tons.

Take a look at this fellow. Those sheaves in the load block are 48 inches in diameter. That tackle includes 24 parts of one and three-eighths-inch plow-steel flat-strand wire rope. Note the three sets of vang lines which steady and control the sweep of the great boom.

Paul's good on his feet—he won't capsize. He has six ballast tanks below the main deck, three on each side. The tanks on one side can transfer 400 tons of water to those on the other at the rate of 3,200 gallons per minute. This means that if the boom is hoisting a heavy tug or locomotive from one side, the tendency of the barge to dip on that side is easily neutralized by the shifting of water ballast.

It becomes bitterly cold up at the "Soo." Ordinary frozen mechanisms may falter, but not Paul Bunyan's. Hot steam circulates through his artery-pipes at critical places. Note another anatomical novelty, the "spuds" connected to the steel framework amidships. Functionally they are outriggers, legs which may be lowered to secure a firm grip on the floor of the canal or stream when a mighty heave is being made. Coordinated with the shifting of the water ballast they aid in maintaining the barge in a balanced horizontal position.

At the operating station are located the controls. There is a panel on which lights register the lateral traverse of the boom. There, too, are the levers for actuating the movement of the spuds. Gauges show the amount of water in respective tanks and valves permit the distribution of this water as required. Guided radio permits communication with the deck and engine room.

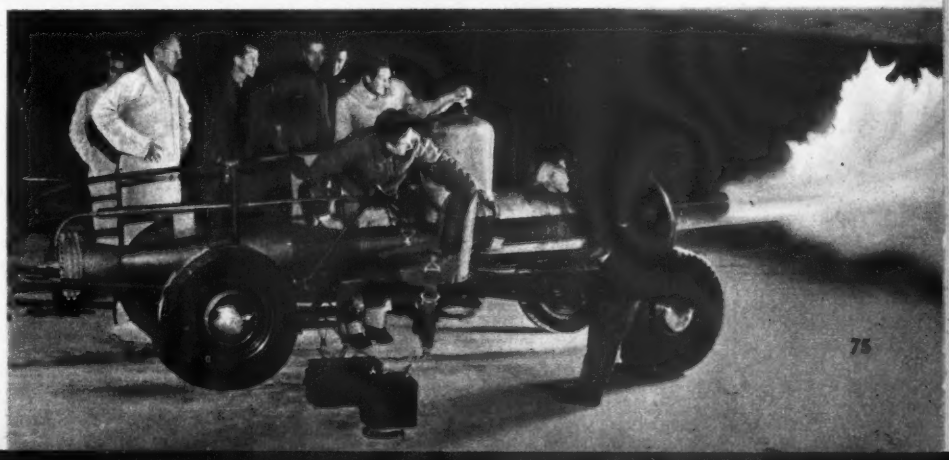
Paul "Derrick" Bunyan's quite a guy.

Intoximeter tests drivers for drunkenness. Below, Trooper Sam MacIntire of the East Lansing, Mich., post gives the test to a fellow officer who simulates a drunken driver.

Hot Spot made when the 10-volt infrared lamp above directs its heat rays at one point reaches 1,500 degrees and lights cigarettes held one inch away. The unusual lighter was demonstrated by Westinghouse.

"Spearhead" supersonic airliner of the future, shown at left, would have four gas-turbine 3,000-hp engines submerged in the 45-degree swept-back wings and two contra-rotating props to each turbine.

Jet Racer below puts on a show for the camera before a test run on Rosamond Dry Lake, California. Gene Kelly, builder, reported that although the throttle was opened only a fraction, speed was 30 mph.



Ever Try Spinning?

Fishermen, some day you're going to try out the spinning reel (which doesn't spin). And you'll like it.

BY GOLD V. SANDERS

THE spinning reel—the "coffee mill on a stick"—is catching on with American fishermen. Long ago we imported the art of fly fishing from England, now we're adopting the art of spinning, which also was originated in England.

From its name, nobody would guess what a spinning reel is or how it works. For it actually is the only reel that does *not* spin. To call it a fixed spool reel would be more accurate and descriptive. And if you ask what good is a reel that doesn't spin—well, that's what this story is for, to tell you.

Spinning is the third method of casting, if we consider fly casting and bait casting the other two. It is something in between the two, with important overlaps on both. With a spinning reel, the fisherman can cast a great distance with lightweight lures of many kinds. Such lures—conceded by many experts to be the best of all fish-killers—are too light for the casting rod, too heavy for the fly rod.

This would be sufficient reason to give the spinning outfit an important place in sport fishing, but there are still other attractive features. For one thing—a whopper—you can't get a back-lash. How can you when the reel doesn't even turn on the cast? Another thing, the reel has an adjustable drag that almost handles the fighting fish for you. Another, you use such fine lines with these outfits that they are all but invisible to the wary fish. And still another, you use a rod as light as a fly rod, and that increases the fun.

How is it possible to cast a lure without having the reel turn? Perhaps the simplest way to put it is to say it is just like pulling the thread off one end of a spool while holding the other end stationary. The spool of the spinning reel sits lengthwise of the rod, so that when you cast, the line flows off without any resistance from moving parts. The cast is noiseless except for the whispering of the line through the guides.

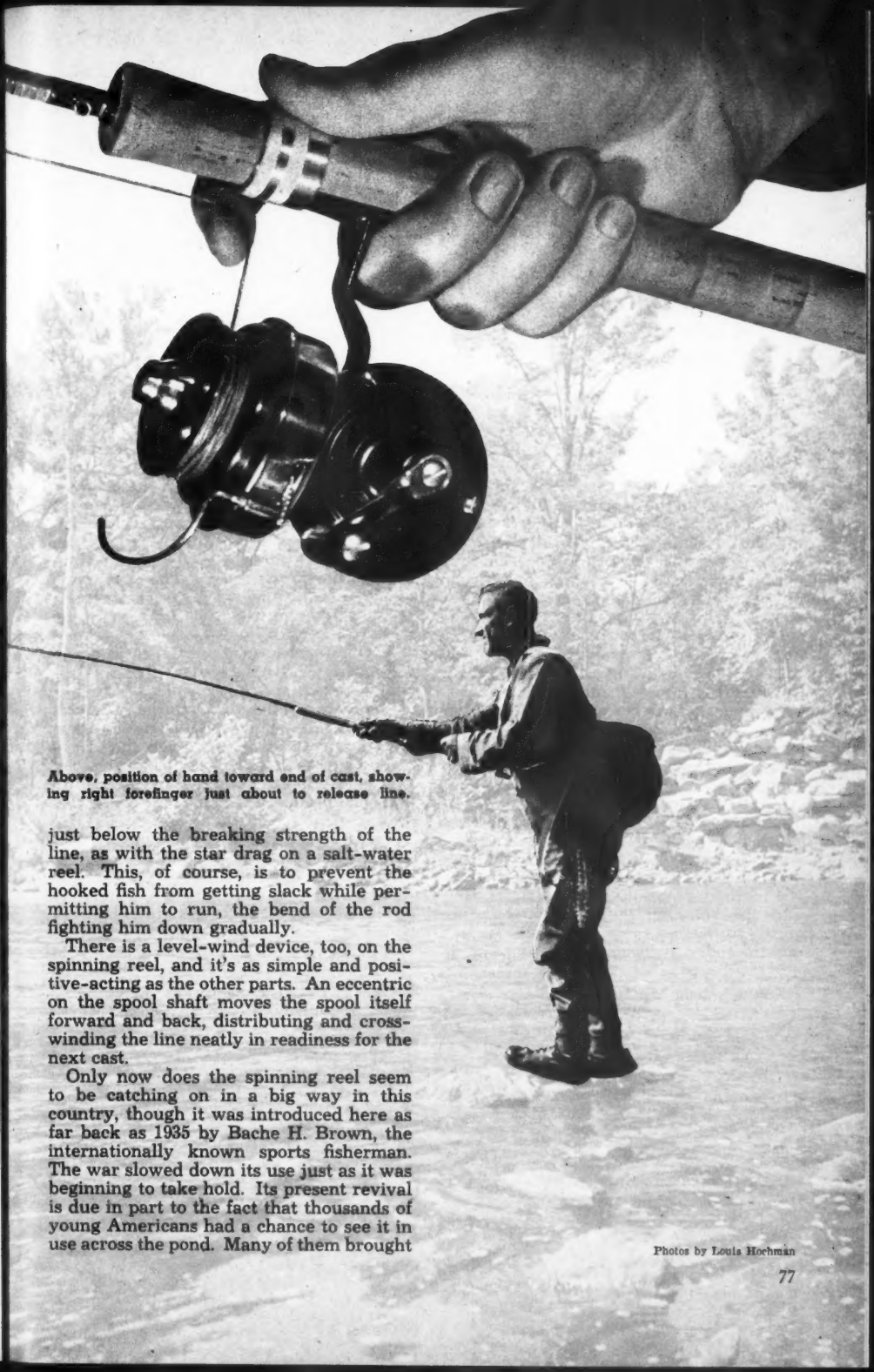
It didn't take a genius to think of that part, for it's the way they pay out line attached to a harpoon; but some real inventiveness was required in devising the method of retrieving the line—and the fish on the end, if he happens to be there.

If you've seen pictures of the "coffee grinder" you will have noticed a long, curving finger that stands out at the front, or tip, end of the reel. That finger wraps the line back on the spool as you turn the handle, very much as if you were doing it with your forefinger. The pickup finger is fixed to the shell or casing that goes around the spool, and it is this casing that revolves when you turn the crank. Simple enough, isn't it?

The spool still remains stationary while the line is being retrieved. The only time it turns at all is when a fighting fish takes out line. Then the adjustable drag works on the spool itself. The tension is set

Jim Deren, proprietor of New York's "Anglers' Roost," explains to Mr. Sanders the unique action and casting advantages of the spinning reel.

At right, Bache H. Brown, foremost American exponent of the spinning technique, casting for brown trout.



Above, position of hand toward end of cast, showing right forefinger just about to release line.

just below the breaking strength of the line, as with the star drag on a salt-water reel. This, of course, is to prevent the hooked fish from getting slack while permitting him to run, the bend of the rod fighting him down gradually.

There is a level-wind device, too, on the spinning reel, and it's as simple and positive-acting as the other parts. An eccentric on the spool shaft moves the spool itself forward and back, distributing and cross-winding the line neatly in readiness for the next cast.

Only now does the spinning reel seem to be catching on in a big way in this country, though it was introduced here as far back as 1935 by Bache H. Brown, the internationally known sports fisherman. The war slowed down its use just as it was beginning to take hold. Its present revival is due in part to the fact that thousands of young Americans had a chance to see it in use across the pond. Many of them brought

Photos by Louis Hochman

Lure's course is stopped by grasping and turning the reel handle. Pickup finger retrieves line.

home reels of this type from Germany, France, Switzerland and England.

The first spinning reel made in this country, the Luxor, was adapted by Bache Brown from European types and is now made at Long Island City, N. Y., by Airex. One of these reels, on a 7-ft. 4½-oz. spinning rod designed by Brown, is shown in the pictures on these pages. As Mr. Brown may be regarded as the high priest of spinning in this country, it was to him we went for expert advice on the subject—and his dope is what we are passing on to you.

The so-called spinning reel was invented because there was a real need for it. The very lures that cannot be cast successfully on either casting rod or fly rod are admitted to be the best all-around artificial baits ever invented for taking trout and bass. They are numerous in variety, taking in spinners of many kinds, weighted flies, wobblers, spoons, and artificial minnows of two-in. length and less. The English Devon spinning minnow, a little over an inch long, is one of the deadliest.

When compared with fly rod lures, these types of fish-getters have the advantage of going deeper, where the big fellows like to stay. Wet fly fishermen have used them by the method generally called strip casting. But the spinning outfit is much better suited to putting these light baits far out, and the rods are designed with more backbone in the tip than fly rods have, so that there is little danger of putting a set in them.

The distance anyone can cast a trout fly is strictly limited, but the spinning rod and reel allows one to cast prodigious distances with ease. The complete lack of resistance in the reel itself permits the bait to sail out through the air just as far as its momentum will carry it. Too, the extremely thin lines used, which the English call thread lines, help to stretch the distance of the cast by reason of their light weight and lack of resistance in the guides.

Spinning has still another notable advantage over orthodox fly rod fishing in that you don't need any free space back of you. Many a small hole in a beautiful stream that simply can't be properly fished with a fly is wide open to the spinner expert. He may be backed up against overhanging rock or trees, and still he can cast. The spinning rod needs only to be taken back as far as the vertical position to start the forward cast. The line, commonly held by the forefinger, is released at a position equivalent to 10 o'clock in its forward motion.

Bass fishermen, who use the casting rod, are pretty well in agreement that the big, heavy lures scare the fish. This is why it is common practice to let the bait lie still for some time—if it is a floater—to allow any nearby bass to get over the fright caused by the splash. Yet there is a strict limit to the lightness of the lure needed to pull out the line and spin the casting reel at the terrific speed attained on a cast. Only the most adept can successfully cast a bait as light as three-eighths ounce any great distance. As against this limitation of the casting rod, consider that with a spinning outfit lures as light as a sixteenth of an ounce can be cast excellent fishing distances. Generally [*Continued on page* 164]

Surprisingly light lines are used, because reel's adjustable clutch cushions shock of striking fish.

The spinning reel may be used on any fly rod by taping it to the upper part of the cork handle.

Navy's Synthetic War

[*Continued from page* 56]

up, say, an irregular enemy shoreline, the contour of the shore is reproduced in the scope. The same thing happens when the sound beam picks up this shoreline from the relief map. By means of calibrated concentric rings in the scope, the pilot can not only tell just about how far away he is from the shoreline, but when he is making an actual flight and again sees this shoreline in his scope, he can recognize it at a glance and quickly determine his position. As in the Contact Flight Trainer, an invaluable feature of this radar trainer is that a contour map accurately reproducing a large section of enemy terrain can be built and installed in a few hours.

Perhaps the most ingenious of all the center's synthetics, however, is an optical-mechanical device by which submarine students can make practice torpedo attacks on enemy ships. Enclosed in a small room is a regulation periscope through which the student seeks out and finally spots the enemy ship, a small model whose movements are controlled by an instructor in another room.

Sighting his target, the student maneuvers his submarine by calling commands through a speaking tube in response to which an assistant mechanically traces the path of the sub on a special glass viewing screen, the sub's path being indicated by a zigzagging, ever-lengthening line of green light. Also standing at the screen is the instructor who, watching the movements of the attacking sub, sends the enemy ship darting about in an attempt to outmaneuver the sub, the path of the enemy ship appearing as a zigzagging red line of light.

As viewed through the periscope, the fight is as real as any ever seen in actual warfare. If the ship approaches the sub, it grows larger in the periscope's eyepiece. If it recedes, it grows smaller. If it speeds up, its wake gets bigger. And if it runs away, it can drop down over the horizon so that only its superstructure is visible.

By means of other controls, the instructor can also arbitrarily place the sun at any point in the sky, and can create almost any type of lighting, such as bright sunlight, cloudiness, twilight, moonlight or fog. By judging the speed and direction of the enemy ship, the student jockeys his sub into what he believes is a good firing position, lets go with a torpedo (his shot being recorded on the viewing screen), and then quickly begins to maneuver for his next shot.

After he has fired three or four torpedoes, the student is brought around to the viewing screen where he is shown his tactical errors and successes as well as hits and misses. •

The Flying Flapjack

[*Continued from page* 59]

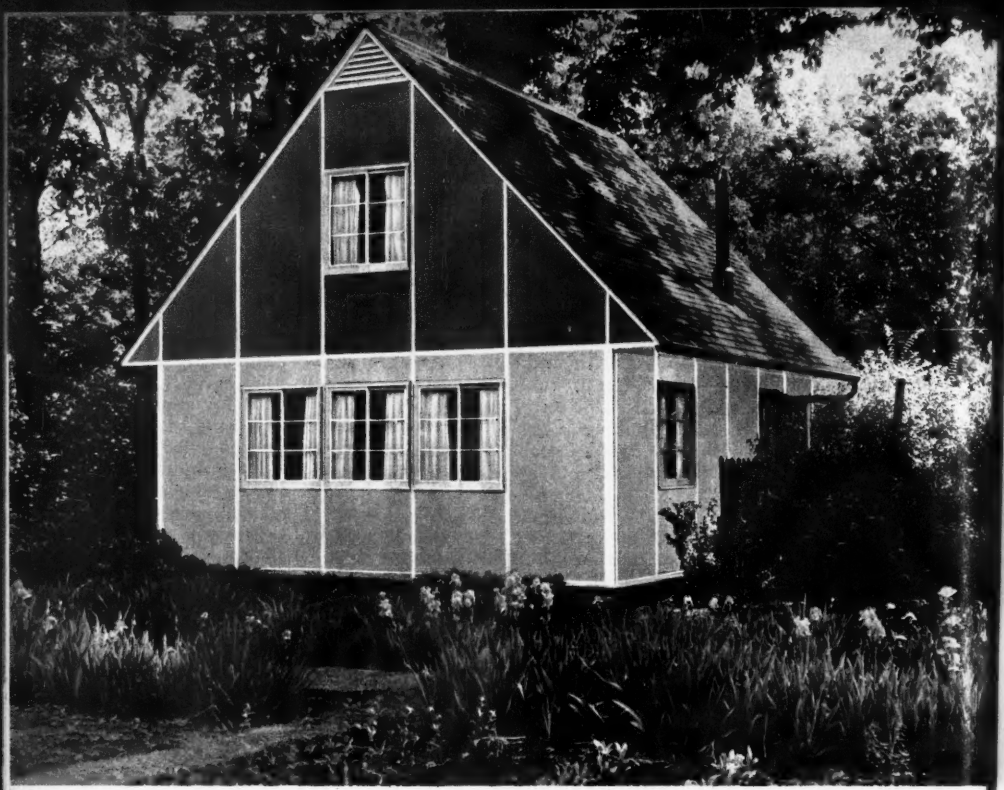
mounted on the rear of the wing, each pair being in the slipstream of a propeller. Two horizontal control surfaces extend from the sides of the wing near its trailing edge. These serve both as elevators and ailerons and accordingly are called "ailevators." They rotate together when functioning as elevators, and differentially when functioning as ailerons.

The V-173 was a wood-and-fabric ship, single place, with 16-foot, three-bladed propellers powered by two 75-hp. engines. In its tests it flew as slowly as 20 mph. and as fast as 100 mph., and could land at a 45° angle at a speed under 20 mph. Its propellers turned over at about 600 rpm. at take-off and 450 rpm. at cruising speed; compare these with the take-off speed of 2,300 rpm. or more and cruising speed of 2,100 rpm. in conventional aircraft. It carried long, fixed landing gear which, no doubt, held down its top speed. The extreme length of the gear was necessary to hold the propeller tips clear of the ground, however. This explains the high angle at which the Flapjack has to hold her nose on take-off and landing.

The blue XF5U-1 is similar in design to the V-173, but with 19-foot, four-bladed propellers. It is all-metal with fully retractable landing gear and two Pratt-and-Whitney R-200-2, 1,800-hp. engines, so geared that one engine can turn both propellers in the event of failure of the other. Its reported speed range is from 40 mph. to 425 mph.; with water injection its top speed is said to reach almost 500 mph. In the future it is planned to install a single gas turbine in a nacelle behind the pilot's cabin. With this single power plant operating both propellers, it should be possible for the Flapjack to hover at 0 speed and reach well over 500 mph.

With a jet or rocket engine and the pilot in a prone position to reduce the thickness of the wing, the Flapjack offers a sure bet to lead the field in the race to smash the supersonic barrier. The air resistance to a plane's flight caused by all parts of the plane which do not contribute to its lift is called "parasite drag." In such a jet wing there would be no such resistance—no extended landing gear, no engine drag, no fuselage. The only resistance would be caused by skin friction of the wing's surface. Of course, without propellers the hovering ability of the plane would be lost.

So don't be amazed when one of these days you hear a whistling sound from the sky and see a blurred, circular object scaling across the heavens at a speed never before attained by man! It will be the Navy's Flapjack, the XF5U-?, breaking through another frontier in aviation's history. •



build your HOUSE with glue

These sensational adhesives become the strongest part of a glued assembly.

BY LUND EKLUND

YOU now can put that new house together with glue instead of nails, if you wish, and have no fear that soaking rain, snow or any vagary of the weather will take it apart. For man's ingenuity and persistence at last have produced what had been sought throughout all history in vain—glue that is indestructible.

Almost unheralded in the midst of more dramatic wartime inventions, there came into wide usage entirely new kinds of glue, man-created substances that proved beyond any doubt their ability to withstand unlimited soaking and even boiling. Not only that, they are impervious to fungi and molds that cause decay in other kinds of glue, and they stand up under extreme changes of temperature.

After first passing laboratory tests of the most brutal and punishing kind imaginable, these glues went into thousands of military craft. They withstood all the rigors of tropical and arctic weather and salt water soaking, and always proved they could stand more than the wood they held together. The glue line, in other words, has now become the strongest, instead of the weakest, part of a glued assembly.

This is of greater import to all of us than we may imagine. For one thing it means there will be more glue used instead of other kinds of fastening, be-

Left, a very strong and rapidly built house. Right, unloading glued, prefabricated wall sections at building site.

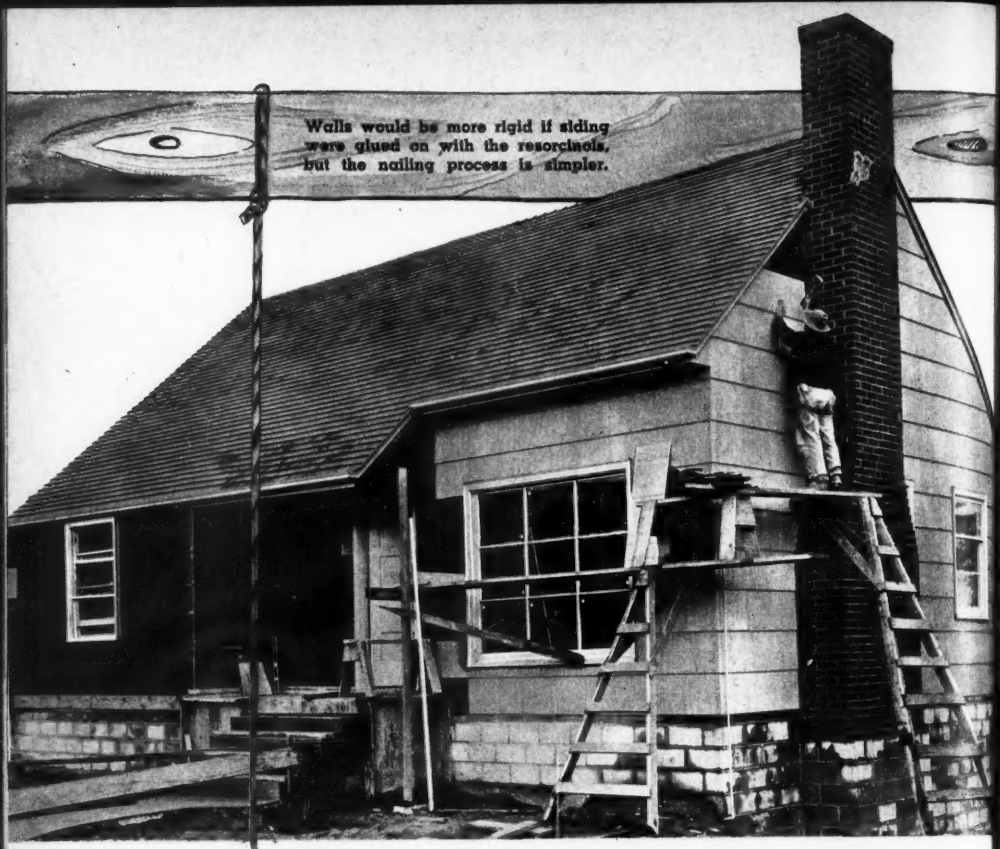
cause in many cases glue makes the simplest, cheapest and most satisfactory joints. We have frequently used nails and screws up to now simply because we could not trust any existing glue to hold and keep on holding.

A very large part of the joining in all the new pre-fabricated houses is being done with glue. These houses will stand or fall according to the quality of the glue used to bond the plywood and hold panel assemblies together. The thousands who are going to buy these houses and live in them would do well to learn something about the adhesives upon which they will depend so largely for their strength and durability.

It is encouraging to know that the largest users of the waterproof glues at present are the plywood manufacturers. But this does not mean that all plywood will now be weatherproof, for the best glues are the most expensive. Neither are all synthetic glues waterproof. Of the great number developed in the past few years, some can only be classed as water-resistant. These are excellent for interior use, better than anything known before. Of all the new types of synthetic adhesives—they are really plastics—only two are genuinely waterproof, according to government specifications: phenolic and resorcinol. Mixtures of these resins also are classed as waterproof. Under the exacting standards set up for all military usage during the war, these, and these alone, were listed as capable of withstanding any degree of soaking, severe weathering and fungus conditions.

These resin glues have entirely different setting characteristics from animal and vegetable glues. Instead of drying to become hard, they polymerize or cure.

House under construction. These resin-bound panels multiply strength by seven.



Walls would be more rigid if siding were glued on with the resorcinols, but the nailing process is simpler.

Everything can be fastened. At left, metal is joined to metal, and how that small joint holds!

Whereas animal glue remains soft while hot, these synthetic glues harden under the influence of heat, and there is no subsequent waiting period for drying. Once they are cured they will not soften again from heating. There are other synthetic adhesives, of the thermoplastic type, however, that can be resoftened by application of heat.

Many a family has a roof over its head today because of the invention of waterproof glue, and many another will have a home sooner because of it.

Our dwindling timber supply goes a lot farther when plywood is used, instead of ordinary lumber. There is much less wastage in plywood construction, and the thickness of inside and outside walls can be made much less by reason of its superior strength. It may surprise many to know that a house completely covered with plywood siding is seven times as strong as one made with ordinary horizontal siding. These are the official results announced by the U. S. Forest Products Laboratory after exhaustive tests.

This remarkable strength is achieved at less expense in the matter of labor. There is much less cutting necessary during the erection process. Standard plywood panels are 4 by 8 feet. About 70 are required in the average small house, as against 300 to 400 pieces

Strong, rigid, waterproof, easy to work—the new resin-bound plywood panels make superlative boat hulls.

of lumber siding. Wastage may be as much as a third in the sawing of common lumber to fit. This is automatically reduced by the use of plywood panels of large dimension, and it is reduced to almost nothing when the house is specially designed in dimensions to fit standard plywood.

Most sensational of all the new glues are the resorcinols. They are the first waterproof adhesives ever made that will set or cure at ordinary temperatures—70° F. and up. These are ordinary room temperatures. The phenolics can be cured only by application of heat of the order of 200° to 300°. This, of course, requires the use of a hot press.

The phenolics thus are primarily factory glues, while the new resorcinols can be used anywhere and by almost anybody. The expense of the hot press is avoided, and also it is possible to glue up immense structural timbers such as building arches, bridge trusses and ship timbers. Such wooden structures are far stronger than if made by the laborious, if not impossible, process of hewing giant trees to the desired shape. The resorcinol glue is stronger and more durable than the wood itself.

These resorcinol glues could be used to fasten the siding on a house, of course, if means were at hand to clamp and hold it for the few hours required to complete the cure. It would make a more rigid wall than by nailing. Up to now, the new glue has not been used for this particular purpose to any great extent because here the nailing process is simpler.

The assembly of wall sections for prefabricated houses is greatly simplified by use of the new room-setting adhesives. It can be done in any part of a factory, and without resort to the more expensive method of putting the assembly in a steam-heated press. All that is necessary is to clamp the parts together and leave them to cure. If there is need to speed up the cure, this can be done by raising the room temperature.

The addition of a catalyst is the simple substitute for the hot press in employing these wonderful new adhesives. The liquid glue will not set at all until after the catalytic agent, in the form of powder, has been added to it. When the two magical ingredients are combined, the mysterious process of polymerization begins, as in the molding of plastic articles.

Several of the manufacturers of other synthetic resin adhesives are now putting out their individual brands of resorcinol glue. It goes almost entirely to factories and large users. Because it has to be sold at a high price the makers have not seen much hope of selling it in small containers for use of the individual. There is one brand now in retail stores in pint size, however. Cascophen RS-224, made by the Casein Company of America. With it goes a can of catalyst to be added in exact proportion before the glue is spread.

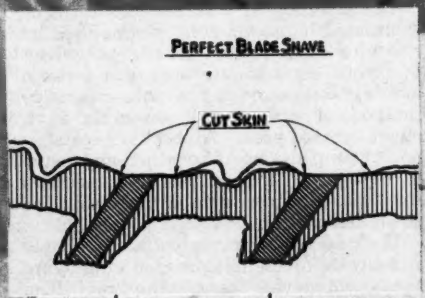
Because these waterproof glues exist, such things as these are now being put together with glue: plywood pipes and tubes to carry water and chemicals, tubular masts and spars, water tanks, photo-developing tanks, billboards, truck and trailer bodies, boat timbers, decks and hulls, bridge girders, building arches. So —you see how far glue has come.

To recite what is being done in fastening wood to wood, however, is to tell only part of the story. During the war, the synthetic, experts also turned out new kinds of adhesives that are just about as wonderful in their way for cementing every conceivable kind of material. One of their important accomplishments is the creation of the first efficient adhesive for bonding rubber to various metal surfaces. All kinds of plastics also can be joined now with bonds of immense strength and durability. Then, there is still another group designed for fastening metal to metal, and some of these give a stronger joint than rivets! •

Buzz off the Fuzz!

Morning groans caused by slips of the razor are steadily being replaced by the hum of motors.

BY ROLAND CUEVA



Above is a closeup of two whiskers. The black part is the "comb" of the electric shaver which presses down the skin permitting the hair to be cut below the skin level. Right: A close, blade shave may cut off some skin around each whisker.

THE voice of the turtle (dove) heard throughout the land on these spring mornings would no doubt be a harsh cry instead of a gentle coo if the bird, like us unfortunate male mortals, were afflicted with the necessity of shaving.

For the most insistent voice to be heard throughout the land, on any morning, is that of poor old John Doe, hacking the night's accumulation of underbrush from his pan and amputating generous portions of epidermis in the process. Daily, from millions of bath rooms come millions of curses and wails of agony as the steel glints, the fur flies and the blood spurts.

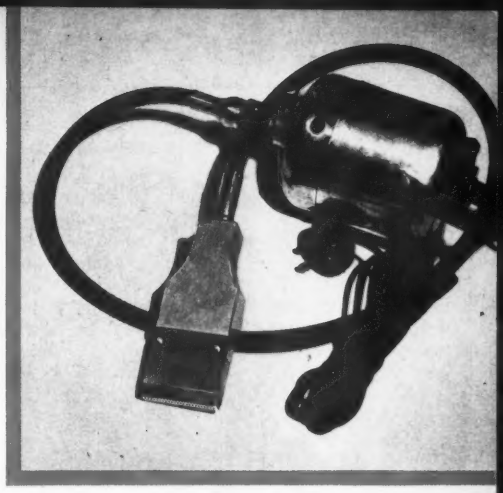
But, thanks to the late Colonel Jacob Schick, the stentorian volume of mug-mangling moans is steadily being replaced by the happy humming of small motors. More and more men are discovering that electric shavers really do shave, and without the time-honored and time-consuming rituals attendant to razor, or as the electric shaver companies like to say, "old-fashioned" shaving.

The first dry shaver patents were issued in 1894, but it wasn't until 1910 that anybody thought seriously about the idea of an electric shaver. In that year Jacob Schick, recently retired from the Army, went gold prospecting in Alaska. He didn't find gold, but he dreamed up the shaver idea while recovering in a wilderness shack from a sprained ankle and growing an irritating crop of whiskers. He spent some years in experimentation, designing hundreds of cutting heads, but it wasn't until after World War I that he really picked up speed and in 1928 patented the forerunner of the present dry shaver.

The first successful model, entirely handmade by the Colonel, had a clipping head like sheep shears and a huge motor on a stand, connected to the head by a long flexible shaft. Gradually, through a succession of new models, the weight and motor size were reduced until the sleek, palm-sized jobs of 1947 emerged. The shaving head remained basically the same, though much refined.

Before the war there were thirty-odd shavers on the market, most of which were in the bargain basement class and made a lot of noise and vibration while doing little or no shaving. Today the field has narrowed down to the big three, Schick, Remington and Sunbeam, with Packard one of the few other serious contenders. It is estimated that more than 2,000,000 shavers worth over $32,000,000 will be sold in 1947.

Several years ago Remington introduced the double-headed shaver, followed by the triple and now the quadruple. Where it will all end no one knows, and eventually your electric shaver may have as many heads as the Hydra, but there does seem to be scientific evidence that the multiple-head shaver works faster and more efficiently, particularly on tough beards or blue faces than the single head type. At any rate, the latter seems destined for extinction, except in the case of the Sunbeam, which operates on an entirely different principle from either the Schick or Remington.

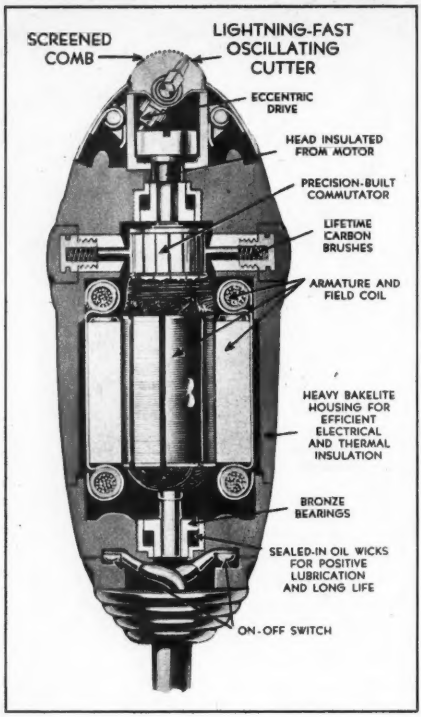


From Schick's first successful model, above, have emerged the sleek, plastic jobs of today.

Basically, all electric shavers consist of a shaving or clipping head powered by a small, high-speed electric motor contained in a plastic case which is also the handle. In the Schick and Remington shavers this little motor operates on a magnetic principle. A tiny, laminated steel-alloy armature whirls in a horizontal plane between curved steel arms which set up a powerful magnetic field.

The secret of the motor's success lies in the super-precision fitting of the armature into these magnetic arms. As the armature spins it trips a cam, or actuating lever, connected to the moving part of the shearing head. The motor turns up about 8,500 rpm's and flicks the shearing head back and forth at a rate of about 7,200 movements per minute. The shaving heads themselves are made up of two slotted, ground steel channels, the inner one moving against the outer, which in turn goes against your beard.

As the hairs are pressed through the slots they are clipped off at or a little below the base. Due to the design of the slots it is impossible for skin to enter them —in fact, they actually push the epidermis back from around each hair. Imagine two contacting picket fences, one moving back



Left: Phantom drawing of Sunbeam shows curved steel head and series-wound brush type motor.

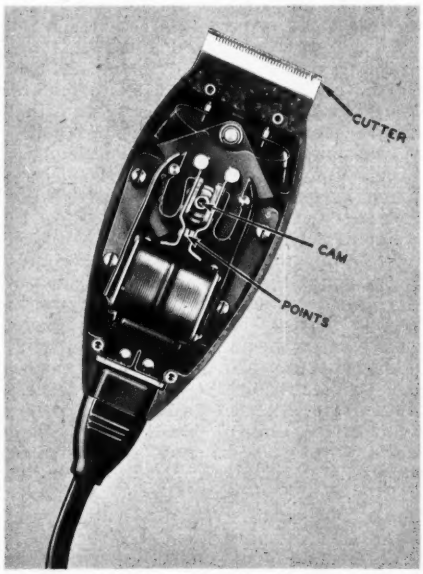
and forth, and you've got the picture. Any shrubbery sticking between them gets lopped off.

Double, triple or quadruple headed shavers operate on these same principles, though of course the motor has extra actuating levers to trip, one for each head. Shearing heads require more than 60 separate manufacturing operations, and are as precision made as a fine watch—indeed this is true of every part in the whole shaver, of which there are nearly 120.

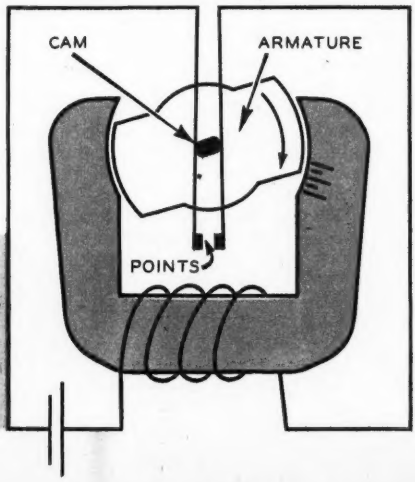
Sunbeam shavers operate differently. They have a one-piece curved steel shaving head 2-thousands of an inch thick—a screened comb perforated with a pattern of holes through which the whiskers project. A fast-oscillating, hollow ground, cutter blade held against the inside of the comb by centrifugal force clips them off.

The Sunbeam motor is a Universal, of the series-wound brush type, something like the one on your electric fan on a miniature scale. The motor actuates the cutter holder and blade through an eccentric drive. As in the other two shavers, all lubrication is sealed in and needs no attention.

Standard models work on 110-volt AC or DC current, and shavers are also made for 6, 12, 24 and 32 volt DC current. •



Above is an early Schick model. As armature spins, it trips a cam connected to shearing head. The electric motor turns up about 8,500 rpm's.



Right: Current flows through coil around magnet energizing the magnet and causing armature to revolve. The cam operates the breaker points. Mechanism on other side operates cutter head.

MI Tests The '47 Cars

[*Continued from page 71*]

Pontiac is another '46 suit with new buttons on the sleeves. As usual the chief change is (surprise!) a redesigned front grill. The hub caps are slightly different. There are some new parking lights. The instrument cluster has been revamped. There is a new clock. If you are the owner of a '46 Pontiac don't feel you are out of date.

A word on how the '46 Pontiac has proved out might be of use. I have questioned a number of owners—as I do all new owners, when I get the opportunity—and all seemed pleased with their postwar Pontiacs. The models offered are the same as last year, the Streamliner, with a 122-in. wheelbase and the Torpedo, with a 119-in. wheelbase. A choice of six- or eight-cylinder engine may be had with either chassis. One note of interest (which may be telling tales out of school), is that the F.B.I. has bought quite a number of the new Pontiacs for their agents, and believe me, some of these boys are tough on cars.

NASH. As in 1946, Nash is continuing with two models, the Nash Ambassador and the smaller 600. The principal change between these and last year's cars is—you've guessed it, a redesigned massive front end and a new hood ornament. Some of the interior fittings have been rearranged, too, and there is two-toned interior finish. Period. The chassis of both cars remain exactly as they were.

Since testing the '46 Nash 600 over a year ago I have heard many favorable reports about it. It's proved itself one of the most economical full-sized cars ever built in America as far as gasoline consumption is concerned, 25 to 30 miles per gallon being average at speeds of 40 to 45. As we pointed out last year, in order to obtain economy, sacrifices must be made, and Nash has struck a nice compromise. The 600 has a small—approximately 80 hp—engine that gives it plenty of punch for ordinary use, though it will never win races or scare birds climbing hills. It is a top-grade riding car, and the accessories are about the best available. The Weather Eye, a combination fresh air circulator and heater, is by far the best unit of this type in the low-priced field.

We'll bring you the complete story on the Nash and all others when the manufacturers introduce really new models. •

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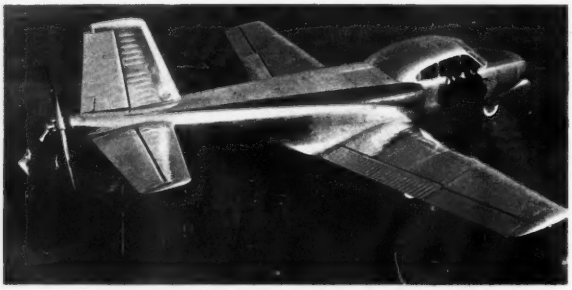
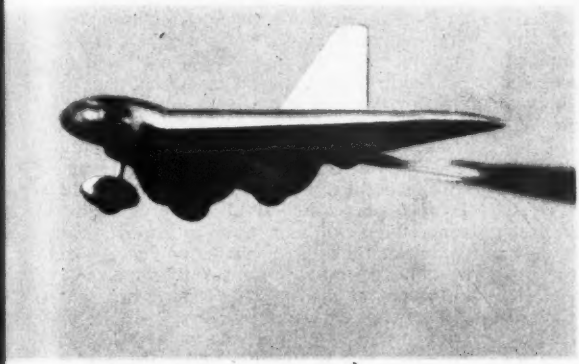
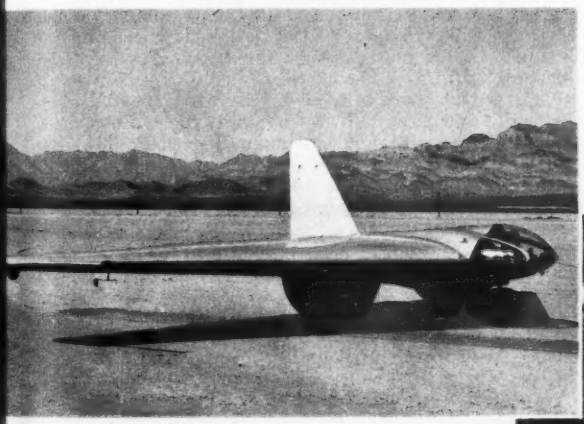


Tail Prop of Douglas Aircraft's new five-place Cloudster is said to increase efficiency of the wings and to entirely eliminate propeller turbulence. Designed for charter service and executive use, the new all-metal low-wing monoplane is powered by two 250-hp Continental engines mounted inside the fuselage behind the sound-proofed passenger compartment. The single eight-foot propeller is aft of the rear control surfaces. Either engine may be cut in or out without affecting flight control. Cruising speed is 200 mph; range, 1100 miles. Rate of climb is 600 feet per minute with one engine and 1500 with two.

Four-Wheeled Bicycle enables handicaps to ride on two wheels and stop on four. When he wishes to stop, the disabled person can, by pushing a lever, lower two retractable wheels which fully support the bike while stopping or starting. The beginner can leave the auxiliary wheels down until he gains confidence. The attachment is the invention of Edward J. Dyksma, 15116 Marshfield Ave., Harvey, Ill.

More Golf Per Minute is provided by the bag-with-a-tube contraption being operated by Mrs. Ferrier to help her husband Jim as he practices between rounds of a top-flight golf tournament. What does it do? It picks up balls. She gives little pokes, and one by one the balls are scooped up into the tube and so into the bag at top. There's a saving of time, bendings, and grunts.





Three Wheels, two riders, but only one pair of eyes are employed in the side-by-side tricycle below. The man, Mervyn Milsted, is blind. His wife rides with him as chauffeur when he goes his rounds as a piano tuner in Tulse Hill, London. She steers and changes gears, he pedals.

Pilot Lies Prone behind the Plexiglas nose of the Northrop "Rocket Wing" MX-324, first U. S. military rocket plane. Prone cockpit lets the pilot withstand higher "G" loads in violent maneuvers, and makes possible thinner airfoil, lessening air resistance. At top we see an actual photo of its first flight, as it knifes through the air at tremendous speed before the fiery blast from its rocket engine. The little aircraft is of Flying Wing design. It was first flown more than two years ago—and afforded test data of great value.

They Talked Me Down!

[*Continued from page* 64]

the white overcast flying absolutely blind, calmly advising us we were "correcting nicely, *verrrry* nicely, right on course, lined up perfectly with the center of the runway now three miles away." We no longer were required to read back instructions so just sat there watching that wavering compass dial.

The voice advised us we were within a mile of the runway, slightly to the left of the center of the strip and should break into the clear any moment. We were to continue on course exactly and take over visually as soon as we broke into the clear. (Personally I was amazed to discover along about here how cold my hands could get and still sweat.)

The fog below, thinned, became tinted with tan and green and an occasional flash of color and vanished. We were in the clear. Dead ahead was the runway, but a few hundred yards away! GCA isn't so hot—we were darn near three feet to the left of that crack in the center. We flared out, settled and the C-47 tires smoked as Major Chapman greased Army 283 in for a neat cross wind landing.

Right there was where we should have left well enough alone for the day. I'd got my story, Blecha had taken some pictures, and also it was chow time, but you know the AAF —always wanting to try it just once more. Major Miller wanted to take a crack at a GCA landing just to refresh his memories of those GCA landings in the Pacific. Oh, sure, sure, let's go around again!

Once more we flew the invisible pattern above the clouds, checked our gyro compass, extended and locked our wheels and started down for the field. It seemed bumpier this time and Major Chapman called for a ceiling, cross wind and visibility report from the tower. It came back "fifteen mile cross wind, lowering visibility, and a broken ceiling of 400 feet, less at times." So what—we were on GCA, weren't we? Into the approach we headed at 1000 feet. Once more we heard new headings, corrections for cross wind, rate of descent, etc., in the same confident voice keeping us on the "straight and narrow."

"Prepare for a rate of descent," came the order and then: "You are now descending at the rate of 500 feet per minute in a normal approach glide, your wheels are down and locked. Maintain this heading. You are correcting very nicely. Coming in dead center on the runway, at a distance of two and a half miles from touchdown. (Pause.) You will break out of the overcast at any moment at which point you will take over visually."

Silence. Down we slid through the soup, Major Miller keeping the compass heading perfect and the rate of glide constant in spite of the turbulence. The rest of us stared ahead and down. Where in blazes *was* the bottom of that stuff? We should be out by now!

The headset snapped, "You are twenty feet too low. Decrease your rate of descent. Decrease your rate of descent. If you can not see the runway to land visually immediately, return to altitude at once!"

We poured on the coal, tucked our wheels back up and got the heck out of there fast. We never did know how close we got to the runway.

I'll skip over the details of the next four tries for the runway. Under normal "instrument" conditions GCA would have brought us in perfectly as on the first try. Now under conditions of but a half mile visibility and a shifting ceiling of from almost 0 to perhaps 400 feet, plus a vicious, gusty cross wind of from fifteen miles an hour to almost thirty-five, at angles up to twenty-five degrees from dead ahead, neither GCA nor the Majors were taking any chances. (I never saw two cooler, or more self assured "fly boys.")

On our sixth approach the GCA gang really outdid themselves and the weather gave us a break at the right moment. When we broke out of the bottom of the clouds at 200 feet, there was the runway dead ahead with a mile visibility on all sides. Kid stuff from here in. As we rolled to a gradual stop down the runway between the white center lines, Major Chapman reported "on the ground" to GCA and added "Much obliged! Quite a relief to get that over with." (A very neat understatement.) It had been three hours since the original takeoff!

But here was concrete proof that GCA *does* work, not only under average instrument weather but under the worst possible landing conditions imaginable. We took no chances, were watched every foot of the way on every approach and guided around until we were sure we could make it. The trouble had been the vicious cross wind and fluctuating ceiling. Had we been low on gas the GCA unit would have upped stakes and switched to another runway where we could have had an on-the-nose wind for landing. (It takes about forty minutes to change runways with the complete unit, generators, jacks, etc.)

With the GCA unit located on another runway, trued up with plumb-bob and spirit level and ready for business we could have made perhaps one dry run and then set her in. As Lieutenant Harris said, any plane with a radio receiver and accurate compass can be "talked into it" without any other equipment. You don't have to give the pilot anything but instructions for him to follow. But in this demonstration de luxe there were a couple of times when GCA could have stood for Give Colby Air! •

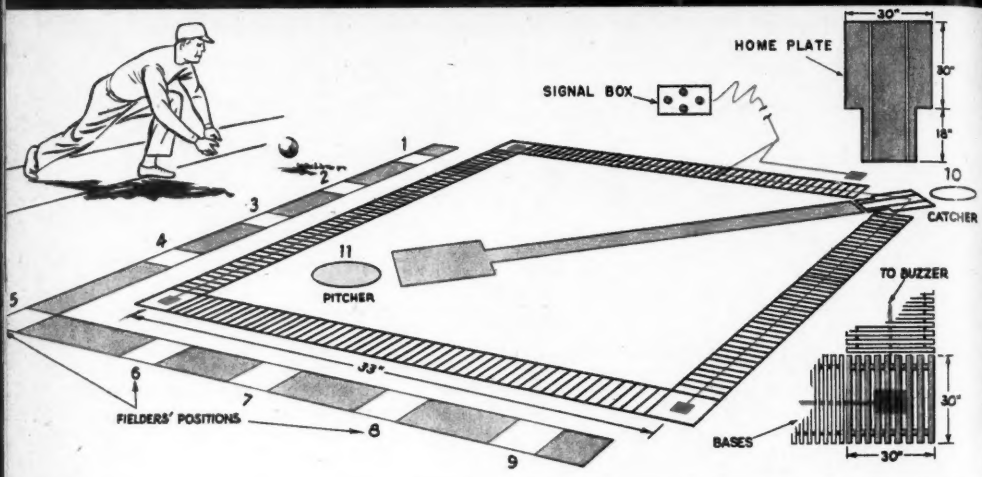
Errorless Typewriter not only saves time, materials and the secretary's nerves but makes neat-as-a-pin copy with even right-hand (as well as left-hand) margins. The electrically driven machine does not print directly onto the paper but sets up a visible line which can be corrected and adjusted for spacing before it registers.

125,000 Carat jewel displayed at left by Mrs. Edward J. Danziger of Rio de Janeiro is the world's largest aquamarine. It weighs 56 lbs. and is insured for $500,000. Mined in Resplendor, Brazil, the precious stone, consigned to Duke International Corporation for sale, was exhibited by the Brazilian Trade Bureau, New York City.

Girl Samson at right, with a little help from the truck she is driving, lifts a sports car and passengers ten feet off the ground. The new British carlift is known as the Fork Truck and is made by a Coventry firm. The mechanical helper is easily operated and is being placed in use in numerous factory yards. The British War Office is reported to have ordered hundreds of the machines.

Super Dog-House was made from the Plexiglas section of a bomber's gun turret and is a novel addition to the growing number of peacetime uses of products of war. At right, three-year-old Nancy Evans, of Detroit, Mich., makes friends with a cocker puppy, one of three occupants of the latest in abodes for canines.

Blind Man's Baseball



YOU wouldn't think it, but the blind can now play baseball. Using ears instead of eyes, even the totally blind can now experience the same fun and thrills from active sport competition so long enjoyed by their luckier sighted brothers.

Sound baseball is an invention of Robert V. Chandler, former Superintendent of the Industrial Home for the Adult Blind in Oakland, Calif. A rabid baseball enthusiast himself, Mr. Chandler puzzled out a scheme for providing actual baseball participation for the blind men under his care.

His finished product consists of baseball with a jingle, plus a buzzer and a bell. But it is still baseball. The playing field is a standard diamond, deviating only by having yard-square bases and yard-wide, carpeted base lines. A special indoor baseball with a jingling core, a hockey stick with a metal plate on the face to eliminate wrist shock when the ball is hit, buzzers, bells—these comprise the playing equipment.

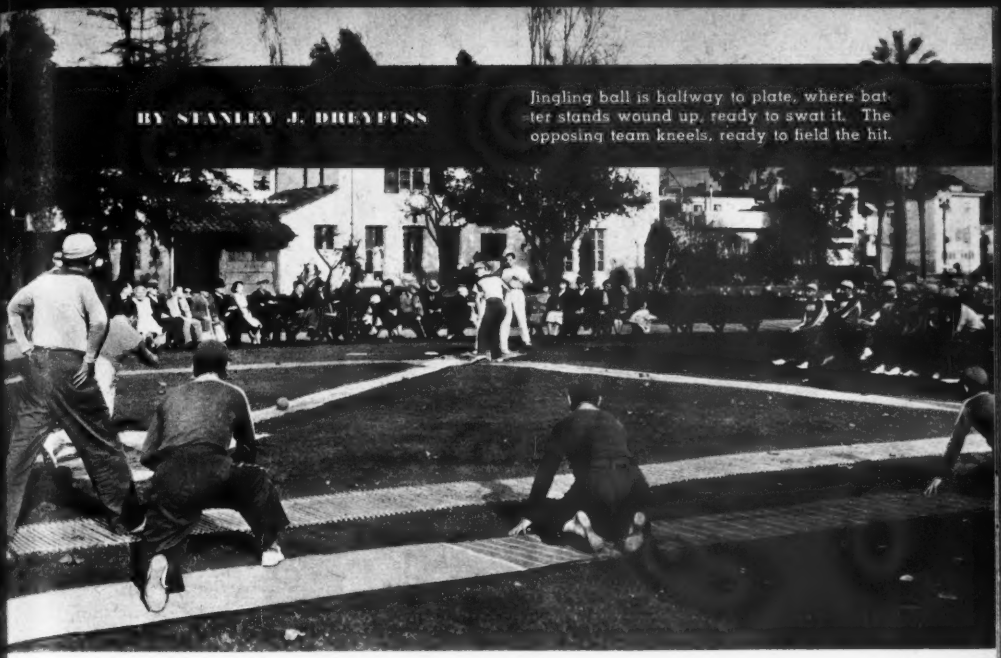
Each team consists of ten players instead of the regulation nine, all but one of whom line up on hands and knees, spaced a minimum of five feet apart, back of the base lines between the first and third sacks. The tenth man is the catcher. He usually has partial vision. The pitcher—a sighted man—is really an eleventh man in the field, but, since he hurls for both teams and is ineligible to play for outs, he is not counted a team member.

The pitcher rolls the ball to the home plate and the batter, guided only by the sound of its jingling, swats it with his hockey stick. The fielders hear the ball coming, and the one nearest it fields it and rolls it toward the base for which the runner is heading at a very fast walk. The shoes worn by the players are made of a special material which enables them to know by feel when they are on the path between bases. The ball must cross the runner's path to put him out.

Under each base is a bell or buzzer of a different tone, used as a signal for the batters and runners and as a base locater for the fielders. When a batsman hits a fair ball the umpire rings the bell at first base by pressing a button of an automatic, portable signal box, thereby both signalling the batter to run and indicating first base's direction. No runner on base may leave his base until one of the base bells has sounded, and then he may advance one base only. The bases themselves are bevelled on each side to prevent obstruction of the ball.

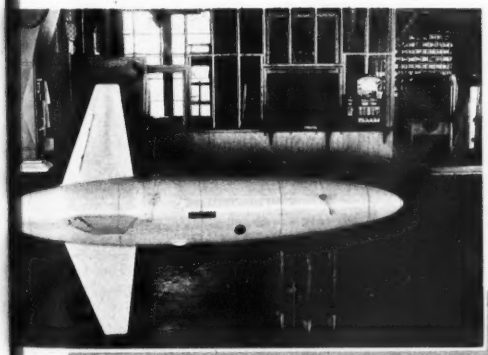
In order to call strikes accurately, home plate is marked with three lanes, and strikes are judged by the lane used by each player. Any ball rolled through his lane and not hit is called a strike. Any rolling outside of the lane is a ball. Batters are allowed four balls and three strikes, as in the standard game. A complete game consists of seven innings. ●

BY STANLEY J. DREYFUSS



Jingling ball is halfway to plate, where batter stands wound up, ready to swat it. The opposing team kneels, ready to field the hit.

STEP-ROCKET



HERE is the 600-mph Tiamat, a guided missile and one of the first successful step rockets. It was developed in secret by the NACA and now is being tested as a model for war missiles.

The Tiamat is launched from a rocket launcher by the power of a "rocket booster" assembly mounted on its tail. After it has reached its normal flying speed its booster, exhausted, drops away and an internal rocket engine continues the flight.

It carries instruments for the recording and transmission to the ground of such basic information as speed, control movements, degrees and speed of roll, and vertical and lateral acceleration. •

How to behave in the air

Here are some timely tips on what to expect on your first ride in an airliner.

IF YOU are one of the thousands of Americans who will make their first air voyage this year, you're in for a few surprises in the way of customs and etiquette. For instance, even Emily Post will tell you it's perfectly proper to chew gum while aboard. As a matter of fact the hostess will probably offer you some just before the take-off and before the plane begins to come down for a landing. It helps relieve ear pressure caused by rapidly changing altitudes.

Tipping is out, thank goodness. And the meals are part of your passage so don't offer to pay for them. Meals are excellent and are served hot. Between times, a cup of coffee, tea or hot chocolate is yours for the asking. Fresh fruit, fruit juices, sandwiches and cookies are also on tap.

You'll find that there's no particular mode of attire more appropriate to air travel than to any other form. But remember that you go very quickly from one climate to another. Maybe you'll leave New York in below-freezing temperatures and a few hours later arrive in the balmy South.

Seats are not reserved, so take your pick. If you want to get out and stretch your legs at intermediate points, the hostess will supply a seat card which says "occupied."

Baby will be well taken care of during the flight. Standard airline "baby kits" have 61 items ranging from prepared foods to diapers.

You'll find air travel comfortable and fun. The best over-all rule is to relax and enjoy yourself. Bon voyage! ●

Airline hostesses are trained understudies of mother. Below, Doris Fricke of Indianapolis, Ind., tests a bottle in the plane's kitchen.

Here's welcome news—tipping is not permitted. And food—delicious, hot, full-course meals—are part of your passage. No payment accepted.

Pets can fly in the baggage compartment when properly crated. Below is Marie Reha of Chicago with a pair of husky canine passengers.

This dog—the eyes of a Marine who lost both of his at Iwo Jima—was an exception to the rule banning pets from the passengers' cabin.

Photos by Rudy Arnold

Rule number one is to fasten your safety belt before landings and take-offs. Above: Frances Howley of Boston, Mass., assists a passenger. Below: Don't worry about baby. Everything is supplied from diapers to dozens of babyfoods.

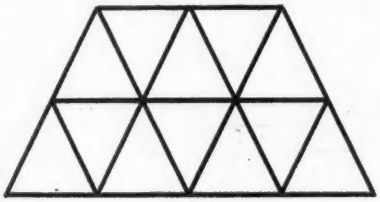
It's okay to take your secretary and dictate letters while en route—as this executive is doing above. Below: If you want to get out and stretch—and keep the same seat—the hostess will give you a card marked "occupied."

MI brain busters

BY DR. HARRY LANGMAN

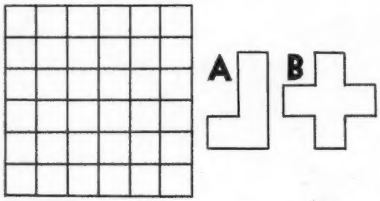
Rattle these five puzzles in your noggins, Fellows. Answers are on page 162

10. Leaving Three Triangles



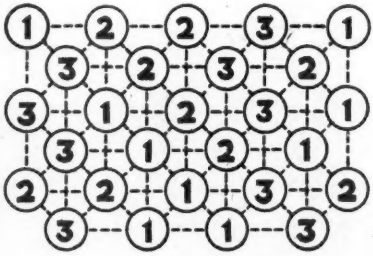
We have 23 toothpicks arranged as shown, forming three large triangles and 12 small triangles. There are eight problems (a to h). In each problem you are to take away a given number of toothpicks, leaving just three triangles. The three triangles must touch. All right: Problem a, remove nine toothpicks, leaving just three triangles; b, remove 10; c, 11; d, 12; e, 13; f, 14; g, 15; and h, 16.

11. Cutting the Square



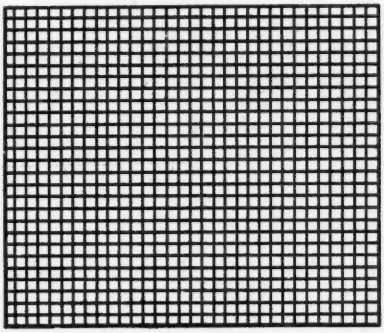
Can you cut the square slab into pieces of the size and shape of A, or of B, or of both, with nothing left over? The shapes must be kept face up.

12. Finding the Triplets



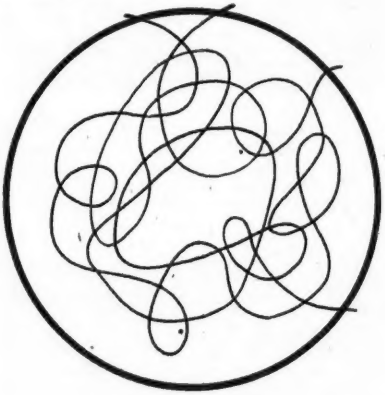
Connect a circle with two others, adjacent, along the dotted lines, so that the sum of the three digits in the circles is 6; then connect three others in the same way; and so on. Can you get nine such groups?

13. Grandma as a Cut-up



Grandma brought home a remnant of cloth, 27 by 32 inches, to cover a certain table. It was the right area, but she found the table required a piece half again as long as it was wide. She took thought and after a while declared she could cut the cloth into only two pieces which she could sew together again so that the design would be unaltered, the proportion right and no cloth wasted. Little Johnny, always good at school work, found another way of accomplishing it. Are you as clever as they?

14. Circle of Confusion



Can you, without using a pencil, determine by inspection into how many pieces the two twisted lines cut the area of the circle? Better check your count! It's 20 to one you make a mistake here.

Photos courtesy of Gatti-Hallicrafters Expedition

Exploration de Luxe

Modern devices so speed and safeguard the explorer that all the earth will soon be an open book.

BY WILLY LEY

SCENE: Darkest Africa. Time: The Present. A helicopter floats down to a perfect landing beside a fever-stricken man lying on a litter. The flier steps out, holds out his hand and says, "Dr. Livingstone, I presume?"

"Yes, old boy," replies Livingstone. "I ran out of gas, used up all of my atabrine and DDT and I'm on the last of my K-rations. It's about time you showed up, Mr. Stanley!"

Of course the meeting never took place this way, but had all the modern aids for getting to out-of-the-way places been invented when Livingstone went slogging through Africa, he likely never would have needed searching parties.

The life of the explorer has been streamlined for comfort. This doesn't mean that it will be free from occasional danger and worry and the tedious detail which lies behind all research and exploration; but it will avoid most of the exhausting drudgery and physical and mental strain which has sometimes made wrecks of our top scientists.

The war brought two kinds of fatigue, one associated with battle and the other with travel. You can do little about the first but plenty about the second.

With the explorer or scientist, work at the site amounts to the battle fatigue of the

Special truck-installed darkroom affords jungle-proof, on-the-spot storage, developing and printing

The helicopter makes the former jungle-hacking river-risking expedition seem like a nightmare. Quick, clean, cool, it hovers and observes, safe from all the perils below.

soldier. His effort in getting there compares with the soldier's in moving from one place to another. Now, for the first time in history, the soldier's travel fatigue has been pretty well gotten rid of—and the explorer can take a page from the military book when he sets out on an expedition.

With the war, inventions speeded up. The airplane and the helicopter reached new heights of efficiency. Both have proved their military worth and the airplane has already proved a most valuable adjunct to exploration.

One of the most notable uses of the airplane was that made by Dr. Barnum Brown, of the American Museum of Natural History, who found that a trained geologist could tell from the air where fossils might be expected. Flying 20,000 miles over seven states in six weeks, he photographed every likely spot from the air. As he put it, "In these six weeks in the air we secured data that could not be duplicated in 20 years of ground work."

Again, there was the use of the plane in the case of the mysterious Congo peacock. Forty years ago the hunt for such a bird would have taken a full year. It would have

The all-important truck-bourne radio of the Gatti-Hallicrafters Expedition will feature broadcasts to the hams. Note wire recorder behind the mike.

meant a steamer trip to Africa, then a long, hot, damp, disease-ridden journey upstream by river boat, then a long safari through steaming jungles with native porters.

But in 1937, when Dr. Chapin, also of the American Museum of Natural History, went on its trail, things moved fast. He wired the Belgian Congo, two specimens were shot for him, he left Brussels by air on June 19, he arrived at Stanleyville on June 23, he saw his first live Congo peacock on July 16, and he left Africa with his specimens on August 27.

There are still many things to be explored on this earth. Not only are there undiscovered animals and plants but even some parts of the surface of the earth are mysteries. The Graf Zeppelin, in its flight around the world some 15 years ago, reported "new" mountains in Siberia. New waterfalls have been found in South America, one of them possibly the highest in the world. Another discovery is a mountain that rivals mighty Everest, bane of the mountain climbers.

Mt. Everest, in the Himalayas, towers 29,000 feet. It has long been thought the highest mountain on our planet. But in March of 1944 an American Army pilot was flying a mission in Sinkiang Province in Western China. He was off course, in an overcast, but believes he was north of Tingh-siang. Deciding to get above all cloud formations, he climbed, passing 20,000 feet, going until the altimeter read 31,000 feet. Looking around at that height he found himself flying parallel with a mountain, still two to three thousand feet *below* its peak! Had the peak been Everest, he would have been almost that much *above* it. And this Central Asiatic giant may not even be named!

The airplane can be used for total scientific mapping, just as it was used locally during the war. Much of the world is still unmapped. Territories inside Asia, South America, Madagascar, Australia, the interior of the islands of the Java and Sunda seas, are blank spots on our maps of the world. Even Africa, Greenland, Antarctica, and North America are still not completely explored.

There have been so many improvements in travel that the modern explorer will have much more time for on-the-spot research. His jeep will travel through terrain with heavy equipment where only pack-mules went before. If he has to cross water in his explorations he can use the light, shallow-draft boats developed by the Navy. Portable outboard motors will provide the power. There are also amphibious boats that move equally well over land and water.

At far left Attilio Gatti, famous explorer, stands in front of the man-carrying diving tank he will employ in African waters. Above, peering out through a port.

He can thank the inventors for many new safeguards to his health. His food can be packed in small watertight containers. The food itself will be concentrated, nourishing and palatable. His medicine chest will include atabrine, sulfa compounds, penicillin, powerful insecticides and even light X-ray machines in case of serious injury. The X-ray will also be handy for examining certain types of specimens.

His clothing and equipment will be waterproof and immune to mold and rot. His tools will not rust or corrode. He will be able to keep in constant communication with other members of his party by using the walkie-talkie, and with his home base by powerful but portable radio.

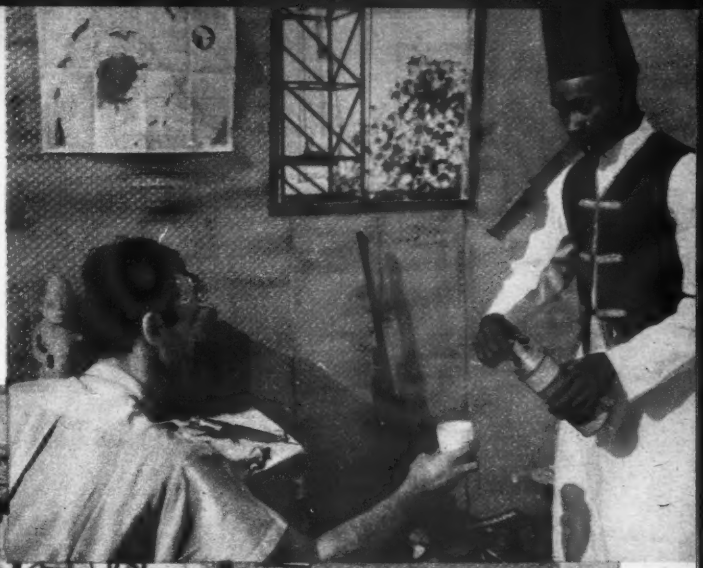
If he is lost on land, compasses that will not break or go out of order will assist him to find his bearings again. If he is lost at sea he can float in comparative comfort in rubber rafts equipped with shark-repellent, flares, and sea-staining powder for searching airplanes. He can have a radio which by cranking sends out an automatic SOS, and he can make his drinking water from sea water itself.

All in all, his life will differ greatly from that of the Livingstone who found himself lost and dying in a place which modern explorers could have reached or returned from in a matter of hours.

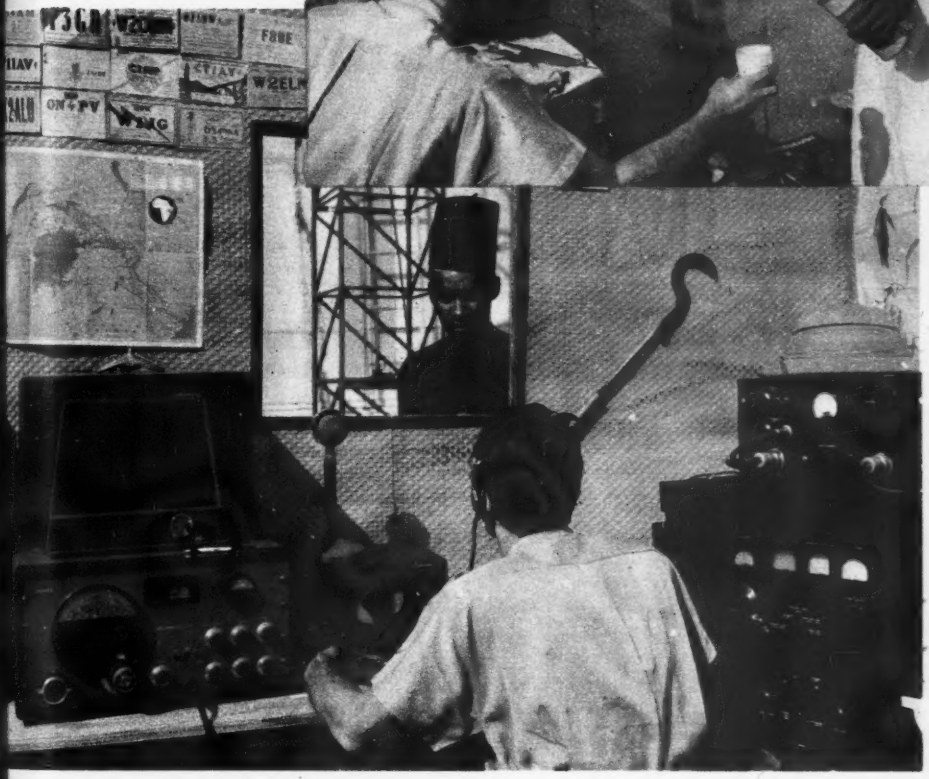
Practically all the new devices, and some still being hatched, will be used in the projected Gatti-Hallicrafters Expedition to the heart of Africa later this year.

Present plans call for use of: the helicopter, to explore inaccessible crater-lakes of the Mountains of the Moon, and observe and photograph the elephant, buffalo, antelope and other wild game and perhaps their gigantic herd migrations; cameras for black and white, infra-red, full. color, stills and movies; Magic Eyes—electronically-controlled cameras that can be placed anywhere and made to take one picture every

The Floating Island is a silent craft, well camouflaged beneath a layer of fresh vegetation, for secretly approaching river life. Its radio permits hot-action broadcasting.



The camp made available by modern methods is a slice of home, with comfortable rooms and cooling drinks. But note that rifle at the window—in case!



At the camp the powerful two-way radio is set up in roomy quarters. From the antenna will start short-wave broadcasts caught by hams all over the world.

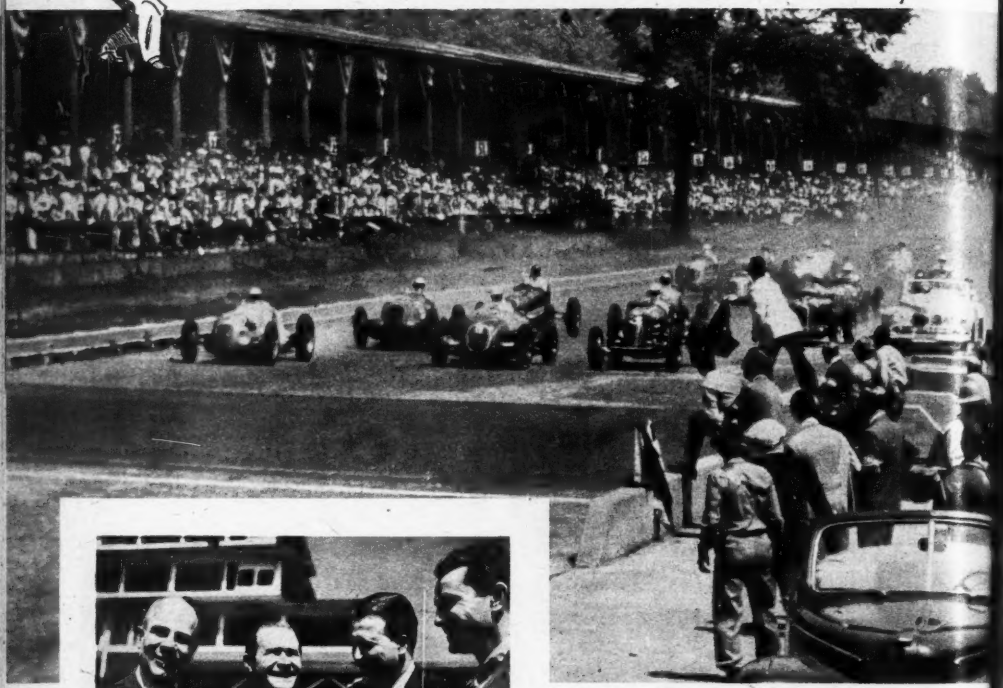
few seconds, or at any interval for which they are set; and Magic Ears—remote-controlled and electronically directed cameras and sound pickups for recording practically unapproachable animals and birds, and details of the speech, hunting customs and tribal life of the natives.

Other novel plans include a Floating Island—a silently-propelled craft, entirely camouflaged by fresh vegetation, that will permit unobserved approach for the film- and sound-recording of river life; a man-carrying diving tank for exploring the life in the lakes and rivers; a Diving Eye which can be lowered 30 feet in tropical waters to automatically take still, motion or speed-light pictures of sub-surface monsters, submerged crocodiles, fights for prey, and so on; and a new Shriek Gun—a siren which will drive away attacking animals.

Radio hams will receive broadcasts of exciting moments right from the field.

Track Fast at Indianapolis

BY TOM McCAHILL



Last year's starting flag was just the warm-up signal—now comes the fireworks.

Left: Jimmy Doolittle, Wilbur Shaw, Henry Ford II and track owner Hulman.

NOTHING short of an atomic bomb going off under my bed will keep me from the Indianapolis Speedway on May 30th because, as they say in the movies, this will be IT!

As we reported last December, the 1946 race just missed being the greatest of all time when all the red hot drivers beat their brains out trying to stay with the racing sensation of the age, Ralph Hepburn's 500-hp Comet. Unfortunately for the race, the Winfield-Hepburn wonder (Bud Winfield built the engine) stayed together until all the buttons popped off the other favorites, then it threw a valve which caused Hepburn's own retirement.

If this misfortune had happened sooner, say at 50 miles, the results might have been quite different. Then the others might have tapered off from wide open plus, to just wide open and remained in the race instead of burning themselves to a crisp trying to stay on the tail of a car that has never been even closely equaled before. So, what has happened since last year that will make this race the best of all? Plenty!

Ralph Hepburn will be back with the same piece of lightning with all the wrinkles ironed out, but so will Cliff Bergere, another old timer, who knows all the angles and who will be driving an exact duplicate of the Winfield-Hepburn car. This new piece of dynamite was built during the past winter in California by Lou Welch of Detroit, which means that, barring mishaps, two cars capable of breaking every existing track record will be in the line-up.

McCahill: "Nothing short of an atomic bomb under my bed will keep me away May 30th. Records are going to fall like hail in Texas."

How about the race's other scheduled 31 starters? If race men were made of lesser stuff, they might say what's the use, let Hepburn and Bergere fight it out but that's not the way they are put together. Instead, they have driven themselves throughout the winter under the lash of ambition to build even better cars, with full knowledge of what they are up against. It should be pointed out that this is not just old school-tie spirit since race cars represent almost unbelievable investments. The Hepburn car reputedly cost over $50,000.00 to build and so did the Twin Coach Special which crashed at 38 miles last year. With this in mind you quickly realize that this is a battle for blood and every builder and driver is out to win and not just die for dear old Rutgers. They all realize what they must do to win and it is doubtful if there is a driver and builder among them who doesn't believe in his heart that his entrant will make Hepburn's car of last year look like a kid's scooter.

Joel Thorne, the millionaire sportsman, for example, owned the 1946 winning car driven by the late George Robson who was killed a few weeks later in a race at Atlanta. Thorne himself didn't drive because, shortly before the race, he was smashed up in a motorcycle accident, but he will be driving in this one. He is one of the best drivers in the business, having finished in the money several times. He realizes that his last year's winning car would have no more chance than Bilbo in Harlem in this year's race, so he's building a new car.

This one will be a rear-engined juggernaut which may give the other boys a real surprise. Thorne knows appearing in a car not capable of breaking all records wide open would be a waste of time and, with his knowledge of building them, he remains very much of a potential threat. Lou Moore, another veteran driver who was weaned on a connecting rod, has built two new front-wheel jobs which shows he's not fooling or afraid of Hepburn either.

The most obvious reasons why all connected with racing expect this to be the race of the century are two very important changes in the rules. This year for the first time in many years there is no weight restriction, which means that the boys can build them feather-light, thereby realizing extra acceleration and snap. In the past

Before a test run, wheels are balanced micrometrically with device above.

all cars had to be built to a formula that required so much weight per horse power and other factors such as length, width, cubic-inch displacement of the engine, etc., but this year any weight goes. Before this news was 24 hours old, the boys were out with their files taking a bit off frames, axles, bodies and any other place where a few ounces could be eliminated.

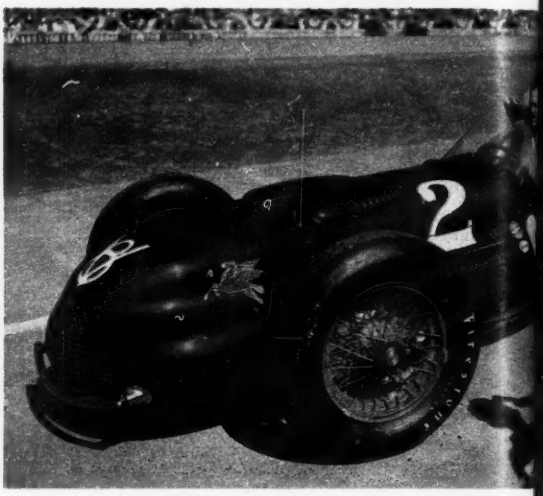
The other important change of rules is that all body dimension requirements have been dropped. Cars, therefore, will be smaller than any ever raced on the track before, with the one exception that the wheel-base must be at least 98½ inches. This also means worm-high cars will be in order as the formula covering height above ground has been eliminated, too. From late reports several cars are expected to appear which will be so underslung that even if they were placed on the track upside down they would have ample road clearance. In other words, the top of the wheels will be higher than the top point of the body.

Another feature will be a new type of racing tire developed by Firestone that has cut resistance on the road by 50 per cent and this will help smash records. Fuel quality, like last year, will remain unrestricted. Consequently, any type of fuel or dope may be used and kept a secret. As Wilbur Shaw, president of the track and one of the driving greats of all time, told me:

Track Fast at Indianapolis

Mauri Rose, defending champ, escaped from this wreck last year with a few minor burns.

Below: Robson after his first and last big time win—he died in a later race at Atlanta.



"We know several very trick and secret fuels were used here last year that were really super fuels, and I'd give a lot to know what they were, but it's the users' privilege to keep them secret and so far as I can find out they certainly did."

I personally witnessed the delivery of one batch of fuel, in unmarked sealed drums contained in huge crates, to a foreign team and I was there when it was poured into the tank. I'll swear it smelt just like the stuff I used to make in my bath tub during the great amendment. Incidentally, the way one of these cars growled and lost its head on the track, I'm sure it had the same effect.

Another new angle to contend with this year is the invasion of European entries. Just before typing this, Wilbur Shaw told me that, due to the showing of the Italian driver, Luigi Villoresi, in his 32-valve Maserati last year when he finished seventh, he has been besieged with entries from continental champions who feel they can walk off with the race. This is not to be taken lightly even though 33 years have passed since a foreign-owned and driven entry has won.

Wilbur Shaw won his last race in 1940 driving an Italian Maserati and last year, though only one foreign entry finished in the money, three cars in the winning circle were American driven but of foreign make. The continental drivers are not used to our track type of driving as they go in mostly for road racing, but their cars have certainly proved themselves far more than just a threat.

Last year's most unusual entry was Paul Russo's $50,000 two-engine job above—it crashed at the north wall after 38 miles.

Left: Keep your eye on this one and another just like it—it's the 500-hp Comet which broke all existing lap records last year.

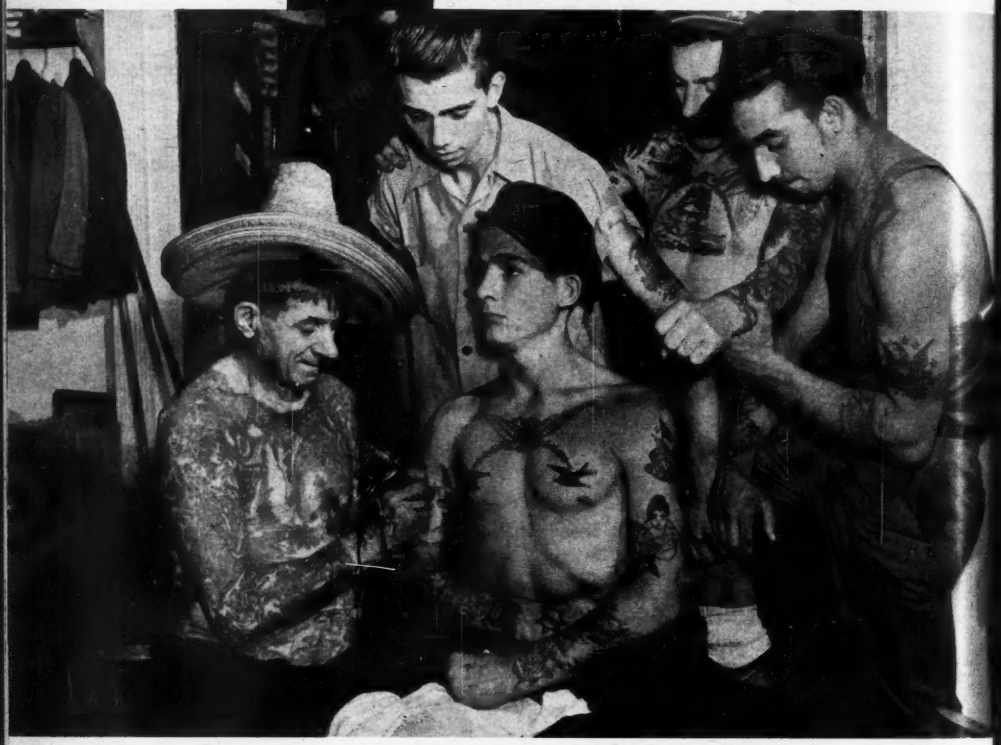
Right: Here's one of the turtles that finished in the money last May with a 60 average. That won't happen again this year.

I can't see how this race can miss being not only the fastest but the greatest of all races except for one thing and that's in the laps of the Gods, the weather. The race will be postponed in the event of rain which would turn the track into a deadly menace that would make Murder Incorporated seem like a choir boy organization. However, rain that might start after the race has begun is what would really ball things up, because all cars would be forced to hold positions and races have been called at 400 miles. In this event there would be no records broken but, being Irish, I'll stick my neck out and say it's going to be a perfect day and records will fall like hail in Texas. ●

Photos by J. J. Fanta

Skinful of Art

Living canvases. Skinfuls of art. And the old master, himself a masterpiece! Fill 'im up, Perfessor!



SOME artists like to paint on canvas, some prefer paper, some billboards, but Charlie Wagner puts his masterpieces smack on the anatomies of his clients. Charlie is a tattoo artist. He's a skin man from way back when.

Every one of his masterpieces is guaranteed to last a lifetime. His works of art become part and parcel of the wearer's epidermis.

Charlie injects his art right into the skin itself, with an electric needle of his own design, and nothing short of an actual transplant can ever successfully remove it afterward. He carries a permanent skinful of art himself—neck to foot. He started tattooing people around the time of the Spanish-American War and has been carrying on in the same spot, at the foot of the Bowery, in New York, ever since.

"In those days," remembers Charlie, "tattooed people were a novelty and I used to make money by exhibiting myself at all the museums. There were only five tattoo artists in the world, then. Now there's thousands."

Tattooing wasn't mechanized when he began. The tattooing instrument consisted of a dozen fine needles, bunched together at the end of a stick, which were dipped into the colored pigments and then poked rapidly into the skin, icepick fashion. Charlie eventually invented the

Closeup of the electric needle as it injects the colored ink 1/32 of an inch beneath the surface of the skin.

BY LOUIS HOCHMAN

electric needle, an electromagnetic vibrator affair which pokes the needles into the skin at the rate of 3,000 times a minute. He uses two machines for his work, one having a four-needle setup to fill in the broad areas with color. The needles penetrate to a depth of one thirty-secondth of an inch. In his spare time Charlie builds and sells these machines to other members of his profession.

Before starting, Charlie shaves off any hair growing in the area and smears on mentholatum. Working freehand, then, he makes a rough pen and India ink sketch of the design, dips his electric needle in black ink dye (which later turns blue), and proceeds to tattoo the outline. He brightens up the design with vivid, chemically pure colors, using his fill-in needle. The after treatment consists of an antiseptic wash and bandage. The art heals in from four to seven days.

In the past, tattooing carried the danger of infection. Careless tattooists sometimes moistened their needles with saliva and thus transmitted diseases to their subjects. Cases of syphilis, tuberculosis of the skin, leprosy, tetanus, and erysipelis have been recorded in medical literature. Today, antisepsis eliminates such possibilities, however. The color pigments used are pure powders dissolved right in an antiseptic. Brown, yellow, green, red and black (which turns blue afterward) are the most popular colors used.

The urge that drives a person to have his anatomy so decorated has been the study of many psychologists. Children who draw ink pictures on their hands and wrists are displaying this urge.

Every war brings thousands of new subjects to the tattoo studios.

"I git all kinds," says Charlie. "Kids fall in love. They come in here and I put hearts on 'em and names of their goil friends. Two weeks later, 'blackout,' they busted up, and the kid comes back to have the name took off. I can't take it off, so I cover it up with nice flowers. There's more people wanta git their tattoos taken off than put on. It can't be done."

Wartime patriotism is a strong motive for getting tattooed. Thousands of servicemen are sporting such patriotic emblems as American eagles, ships, Army and Navy insignia, and elaborate "Remember Pearl Harbor" designs. Proud two- and three-stripers have their stripes permanently tattooed on their arms. Discharged vets have their discharge emblems tattooed on.

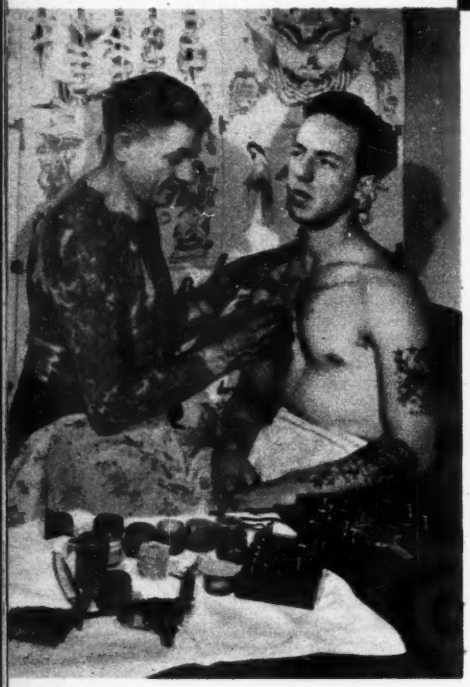
The artistic nude is a great favorite. During the war, many a nude-carrier ran afoul of his commanding officer and was ordered back to the tattoo studio to get his nekkid lady dressed up. Charlie would smoke-screen them with flowers and bathing suits. Of course, many of these nudes are not so artistic. In fact, some feature nothing but curves, with plenty of flesh between. No doubt many of these thick ones got their puffs and sags innocently enough, when their wearer in the course of time put on flesh in those places.

A questionable sense of humor is displayed by some living canvases. Fairly common are women who have bras and panties tattooed on themselves. One guy

Girl wiggles when muscle is moved. Here's a combination of art, the dance, and fun!

Skinful of Art

Below, Charlie finishes inking-in the outline of a "Bird in Flight." Right, the design as it looks when finished. That bird will never leave that chest.



Below, closeup of the tattoo master at work filling in the outline with red dye from a little pot.

who had been wronged by two women had their portraits forever inscribed where it was convenient to sit on them.

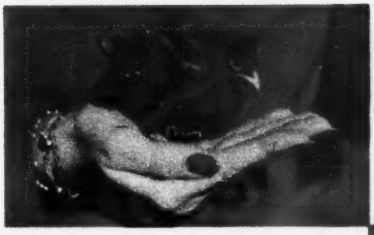
As might be expected, there are cases where the humor is even more obvious.

Believe it or not, tattooing has its more useful aspects. Charlie is frequently called to hospitals to treat certain skin diseases with his vibrating electric needle. In plastic surgery his needle, dipped into flesh-color dyes, has been used to blend skin grafts to match the surrounding epidermis. It has served to cover up skin blemishes. In one unusual case, where a young girl suffering from cancer had a portion of the breast removed, Charlie did an expert job of matching it to the good one by tattooing a new central design on it.

The vibrating needle is very effective in certain cases requiring surface treatment.

Charlie's most difficult client was a white rat, brought in by a young biologist who wanted Charlie to tattoo an identification number on its tail. "Holding that tail down was a job," laughs Charlie. "That rat didn't like the idea at all. He got away once and we had a heckuva time catchin' him. And that wiggling tail wasn't easy to work on, either.

"Gimme plenty of skin, anytime. That's the stuff I like to work on." •



Above: The Puerto Rican colored chicks as they arrived by air express at La Guardia Field. No, they were not dunked in dye—they were born that way.

Below: Here's how it's done. Just before hatching time the eggs are injected—at the end which has no air pocket—with harmless colored vegetable dye.

Photos by Rudy Arnold

colored chicks to order

FRANKLY, we didn't believe it either. But the evidence looks pretty convincing. It seems that down in San Juan, Puerto Rico, a certain experimental-minded senor named A. R. Zeno injected two dozen eggs with various vegetable dyes two hours before hatching time. When the chicks broke through their shells they were peeping happily and were apparently quite normal except that their feathers were bright blue, red, green, pink and lilac. And here they are as they arrived by Pan American air express eight hours later in New York City. Chick authorities generally agree that the process is harmless. Says Dr. Walter Landauer, Connecticut Agricultural School: "The injection of the dye does not hurt the chick because it goes into the albumen without actually getting into the chick itself." Dr. Alexis L. Romanoff warned against the process becoming a fad. There's a law in New York against importing chicks as toys, he added. •

now cows DO fly

BY JACK GALUB

NOW, at last, cows *do* fly—and so do live goldfish, flowers, fruits, lobsters, racehorses, farm tractors, and—well, you name it. Industry is making ever-growing use of airfreight.

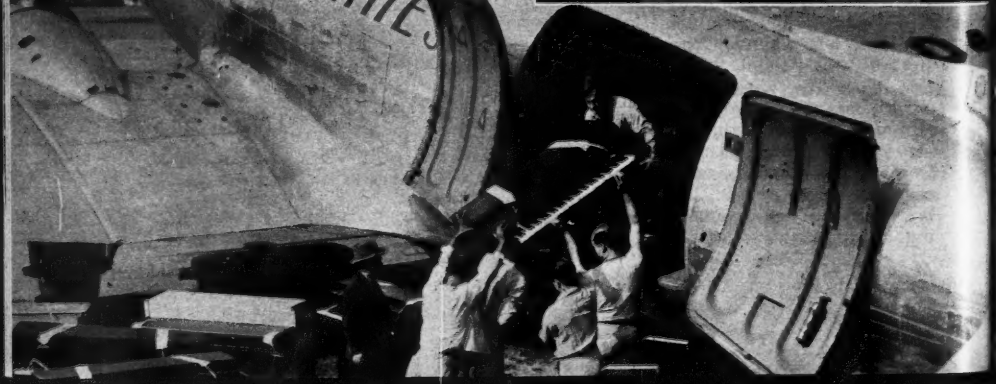
High-priced breeding cattle are flown to South America overnight, without the seasickness caused by cargo ship.

One company recently flew most of its factory from the West Coast to New York when it moved. Refrigerated planes fly perishables. Gowns and dresses are often sent unwrapped, right on their hangers.

Where the freight is alive it doesn't mind the air trip at all. Leo the Lion, MGM's well-known mascot, who has many hours in his flight logbook, actually perks up whenever he gets near an airport, his handlers report. •

At top, Ferdinand, fine Texas longhorn steer, debarks after a comfortable transcontinental flight.

At right, inside of a plane, not a van. Blooded racehorses on planes, airfreight carries 'em all.



wooden railroad

THERE have been wood-burning locomotives, but probably the only railroad in the world to run on wooden rails is the Bourlemaque Central in Western Quebec. Last year, ore bodies containing gold, zinc, copper and other minerals were discovered in rock from 50 to 150 feet below a swamp near the town of Bourlemaque. How to transport heavy equipment needed to work the lodes was a problem until engineers devised the wooden railroad over a 17-mile stretch of treacherous terrain, where even a man on foot will sink in up to his neck. The Bourlemaque Central carries men, machinery, food and building supplies at an average charge of about 20 cents a mile for passengers and $4 an hour for freight. Operations were once suspended for an hour, after beavers had cut through a 20-foot section of the line. But the damage was soon repaired with saplings cut by the driver from the right-of-way. At each end of the line, the locomotive—a '31 Ford—is turned around on a turntable fashioned of metal pipes. After the November freeze-up, dog sledges take over and the wooden railroad gets a well deserved rest and complete overhaul. •

Straight through 17 miles of swamp, the wooden rail bed lies like a web supporting the '31 Ford "locomotive" at right. Rear wheels—see inset—are lined with tire casings to supply traction.

building the DERBY WINNER

Planning to enter the All-American Soap Box Derby? Then coast to fame in the 1946 winning racer.

BY GILBERT KLECAN
1946 Champion

I HAVE always been interested in making things that require the use of the usual homeworkshop tools every dad manages to accumulate, so when news of the Soap Box Derby appeared in the San Diego Daily Journal, I was tempted to try my hand at winning one of the grand prizes; the four year college scholarship or the 1946 Chevrolet sedan which was the second prize. Win or lose, after seeing a former Derby race in the movies, I thought entering the local races would be fun so I obtained an Official Rule Book and started to

Right: Gilbert Klecan poses with the First Prize four year college scholarship certificate and a few trophies. Now a freshman in high school, Gil plans to eventually enter Marquette or Notre Dame University. Below: Oiling the rear wheels before the big race. Background picture is an air view of the Finals at the Chevrolet track, Derby Downs, Akron, Ohio.

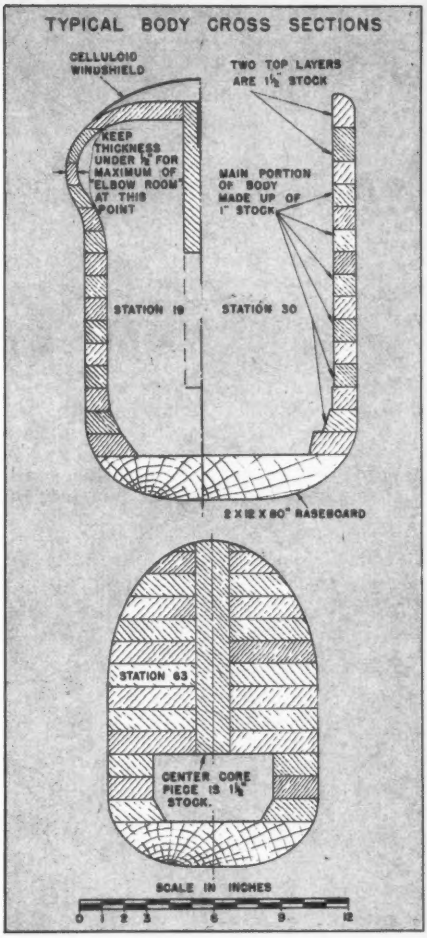
Conceived and first conducted in 1933 by Myron Scott while on the staff of the Dayton Daily News, the All-American Soap Box Derby is generally considered as one of the most popular annual youth sporting events in the nation. Since 1934, and interrupted only by the war, the Chevrolet Division of General Motors and the major newspapers of leading cities co-sponsored local races for mechanically-minded boys throughout the country. Last year, newspapers in 111 cities worked with local Chevrolet dealers in staging eliminations, the winners of which represented their community in the Finals. Those desiring to enter this year should contact their Chevrolet dealer.

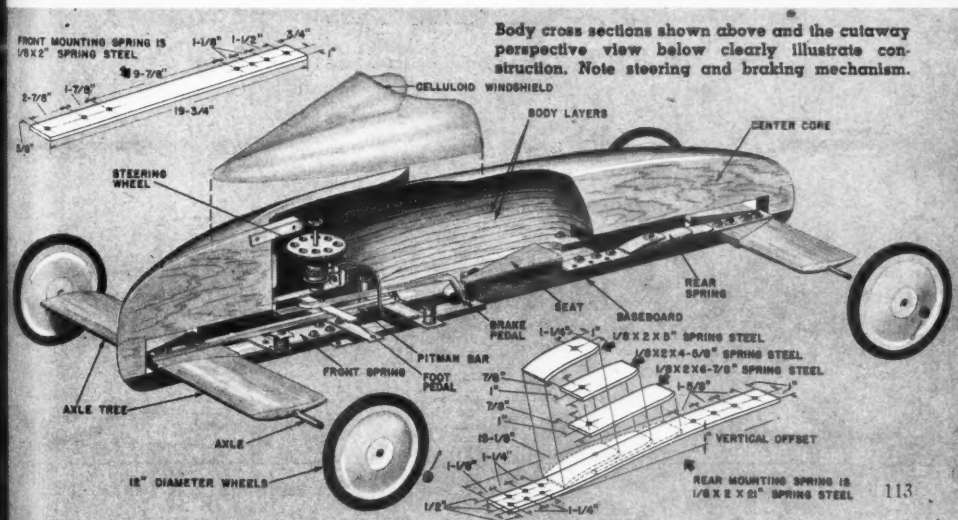
plan my car. What happened is history; I was lucky enough to win the local San Diego Journal race and also place first in the finals a few months later. Not only did I have a great deal of fun building my car, but racing with my buddies and the finalists who came from all parts of the country for the big races in Akron was even more enjoyable.

If you're a newcomer to Derby activity and interested in entering your local race then you can use these plans of my car for your own. Before collecting the building material, visit your local Chevrolet automobile dealer and ask him for more detailed information regarding the Derby in your area. Request a rule book and study the regulations very carefully before you lift dad's hammer and saw.

One of the important points in making a fast car is to have the total weight of both the driver and the car come just up to the maximum weight rule of 250 pounds. Since you are not allowed to add weight to reach this maximum, plan to add or take away a few extra pounds during actual construction, whatever may be necessary, by using lighter or heavier material. My car weighs just about 150 pounds. Another point to watch is the total cost. The rules call for spending not more than six dollars plus the cost of the wheels, which not only makes it possible for every boy to compete but also eliminates "professionals." And here's another fine point to remember; it is permissible to receive advice from your father and friends but *you* must do the actual building.

Any wheels that meet the requirements can be used but it is advisable to use a set of wheels carrying the official All-American Soap Box Derby stamp of approval. Both Firestone and Goodrich make a complete set of wheels and axle assembly and sell them at cost through





Body cross sections shown above and the cutaway perspective view below clearly illustrate construction. Note steering and braking mechanism.

ENLARGED PLANS

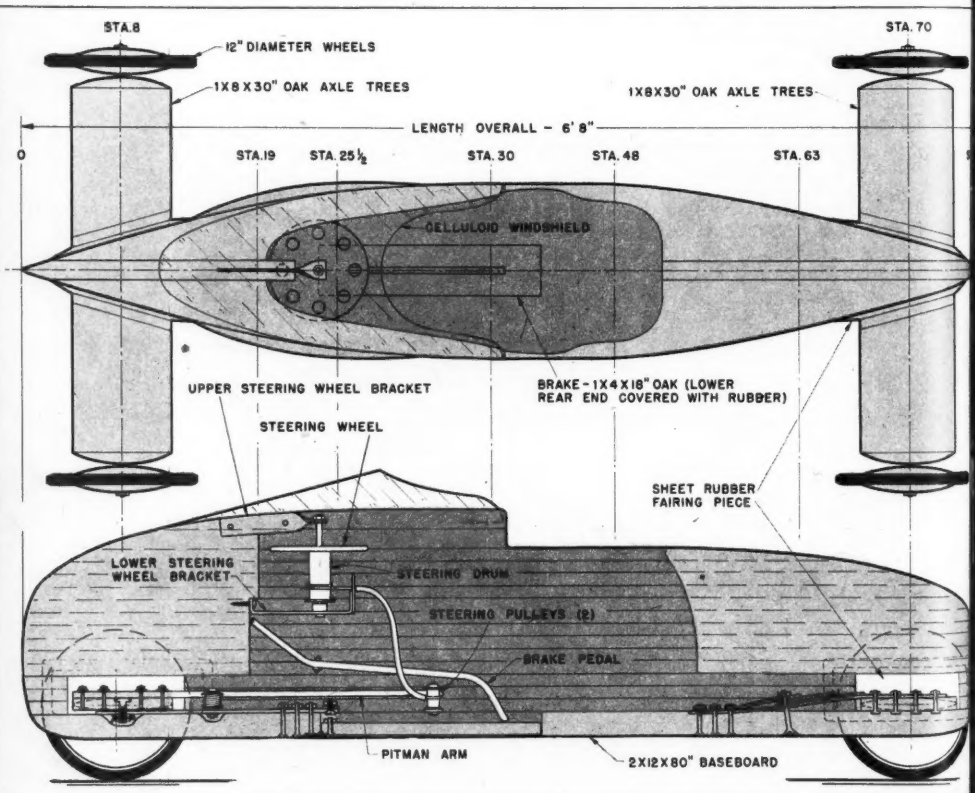
of this racer will make building easier and quicker. Turn to page 160 for details.

your local dealer. Before starting actual construction, study the plans carefully, noting just how the body is formed, the operation of the steering wheel and the drag brake. Once you have a fair idea of how the car was put together you can start collecting your material.

The body is built up mostly from sections of 1 in. thick boards, using the "bread and butter" method. The original car was made from ash planks, because this was the only wood available, but any material can be used. In fact, it may be advisable to use pine because it is much easier to work with. Your wood shed or lumber yard will usually determine just what material you'll use.

First lay out the 2x2x80 in. baseboard plank. Mark off the outline with the aid of the top view and then saw along the line. The body stations are numbered according to their distance from the front; Station 19 is 19 inches from the front, Station 30 is 30 inches from the front, etc. After the baseboard is cut, trace the center core outline (indicated by the light tone) for both the front and back. Scale up the side outline, noting in the perspective view how the core is notched at the bottom for the axle tree. Rather than build up the body and install the brake and wheel mechanism later, build these parts now and assemble them on the baseboard.

The front end uses coil springs which were taken from an old automobile and are 3 in. long and 1¼ in. in diameter. One is mounted on each side of the Pitman arm. In the rear, leaf springs are used, fastened with ¼ in. carriage bolts. The axle trees are 1x8x30 in. oak or other hard wood. Rough trim and then file and sand the bottom and top to the indicated shape. A channel under the trees permitted mounting the axles flush. The bolts holding the axle to the trees are countersunk. The axle tips should be carefully polished with emery

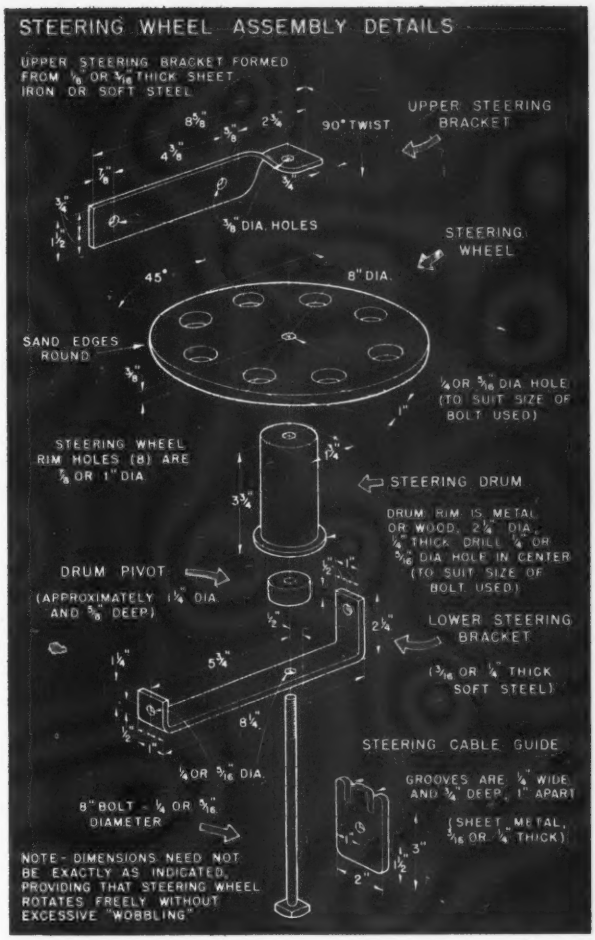


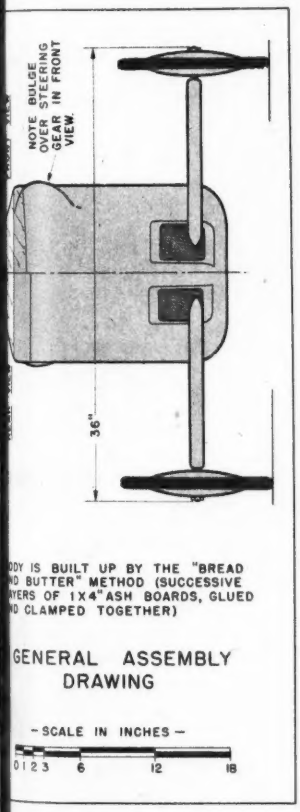
cloth so the wheels will spin with the least amount of friction. Thin sheet rubber inner tubing again covers the opening in the body where the axle trees pass through.

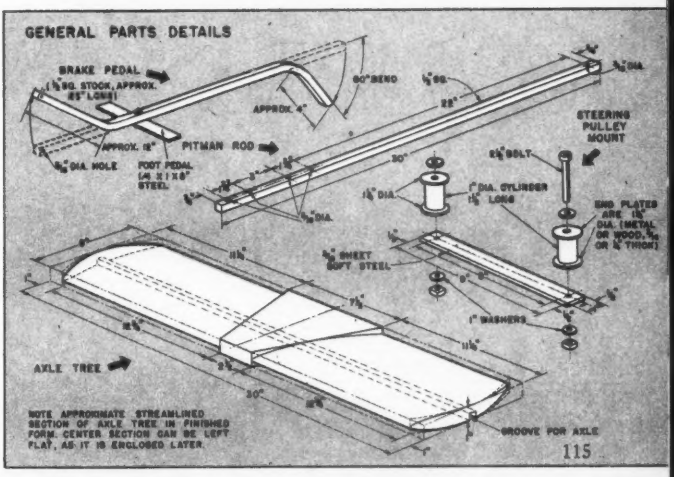
The Pitman or steering arm is bolted to the front axle while the wooden steering wheel is mounted horizontally, as shown. A thin flexible cable runs around the steering drum down to the Pitman arm through two pulleys mounted in the sides of the body. To keep this cable from rubbing against the driver's legs, two lengths of tubing are used between the steering cable guide and the two steering pulleys.

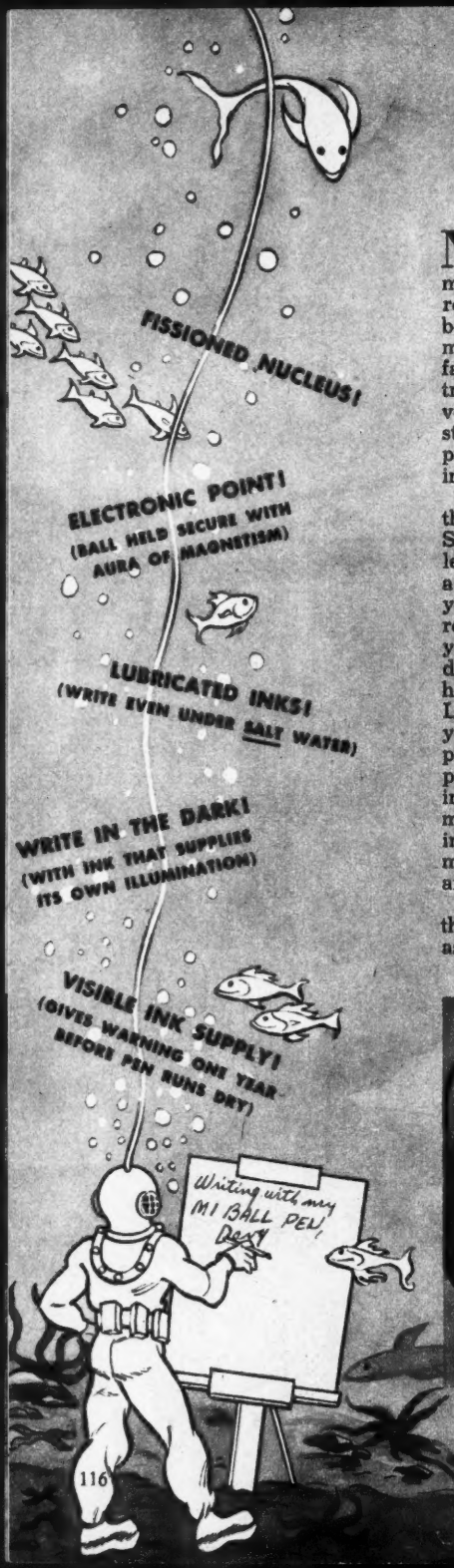
Note that a 4x18 in. cut-

[*Continued on page* 160]









MI's BALL PEN

BY KEN MURRAY

NOT twenty dollars, nor five or even one but only twenty cents is all that it will cost you to make the new MI Ball-Point Pen. Actually this revolutionary instrument in the writing field can be made in four different styles: a conversion model made from a mechanical pencil, the "fifty-center" fashioned from a regular Eversharp Reload Cartridge, and a plastic beanshooter tube, another conversion model using your old fountain pen as a starter and last, a ball marking pen for addressing packages and writing Chinese characters on the inside of your shirts.

Let's begin at the bottom of the price scale with the "twenty-center," which is the cost of the regular Scripto mechanical pencil, a model that has excellent construction and a transparent body, permitting a visible ink supply. If your tastes are a little finer you can use a 29c pencil or if you want to shoot the roll, there's another at 59c. Regardless of the price you pay, be sure the pencil uses standard .046" diameter leads. The pen you'll make from it will have an exclusive feature of "no cap, no click, Loc-point does the trick." The Loc-point means that you can lock the ball point instantly thereby stopping the ink flow so you can park the pen in your pocket without disastrous results. While we're talking about ink, you'll find exact instructions for making "MInk," the sensationally new writing fluid, in the box on page 119. By following the simple methods outlined, you'll get original creations that are out of this world.

A standard 3/64 in. diameter steel ball is used in the twenty-center pen as it has the same diameter as the lead in the Scripto and other pencils men-

If you own a Handee tool, you will be able to ream the pencil tips at production speed.

Nobody, but nobody, we believe will be able to duplicate MI's remarkable new ball pen. A pen with a host of brand new features.

...and introducing Mink

FAWCETT BLUE, all purpose!

ESSENCE OF MIDNIGHT, distinctly masculine!

WASHABLE, for children at school!

LUMINOUS, glows brightly, write in the dark!

ULTRA, shines under black light!

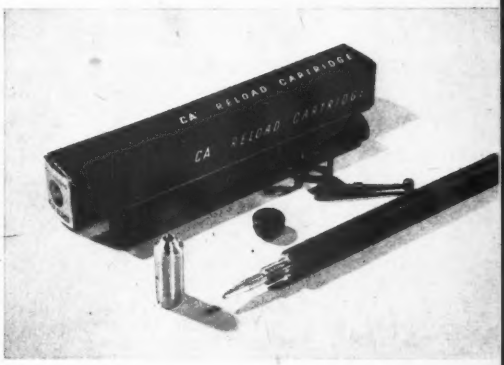
INVISIBLE, but easily "developed" when you know how!

COPYING, for hectograph, ditto and similar duplicating methods!

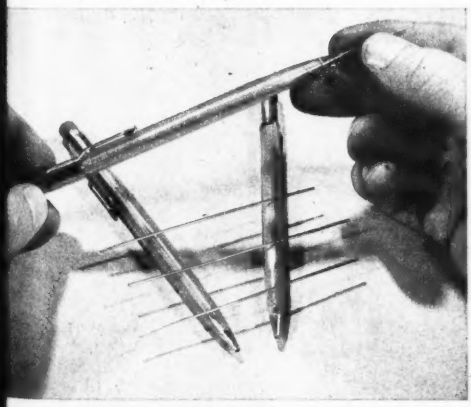
ALBUM, perfect for the photo fan!

tioned. If you can't obtain these balls from your local stores, they can be ordered from Miss Eloise Diemand of the Hartford Steel Ball Company, Hartford, Conn. An envelope of 100 chrome alloy steel balls of the 3/64 in. diameter and the 1 mm. size (used for the fifty-center) will cost you only $1.00, postpaid. A permanent Alnico magnet is desirable for handling these small balls without loss and also for energizing the capillary feed wire shown in Fig. 1. A small magnifying glass, a small anvil made from a bolt and an assortment of discarded dentist's cutting burs, complete the supplies you'll need. To choose the right size bur, compare them with the steel balls under the magnifying lens.

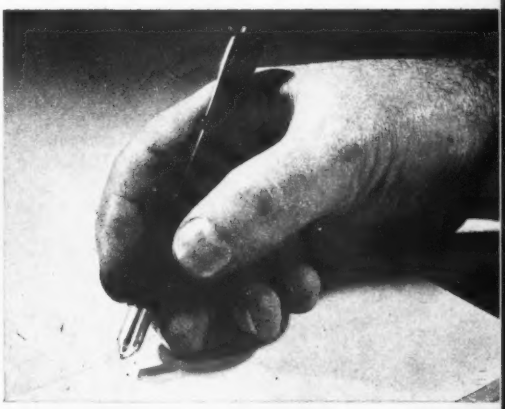
To start operations, begin by removing the lead from the Scripto and replacing it with the Surface Tension Feed which is cut as shown in Fig. 1, to attract ink to the ball point. The latter is then fitted to the pencil tip, the chamber filled with ink and you're all set to do your writing on land or under the water. The tip of the pencil is prepared by carefully cutting away the turned over portion of the brass shell with a large round bur, then making a smaller opening in the plastic underneath it with a smaller bur. (See Fig. 1). Next, straighten a paper clip and insert it in the



Body of the MI Fifty-Center is made from a plastic beanshooter with a button to close end.

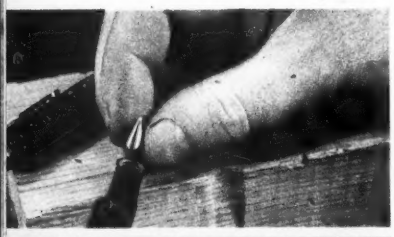


Straightened paper clips are used to make the capillary action feed. Length depends upon pencil.



This is the MI Fifty-Center. It writes perfectly, uses an ink cartridge and has a protective cap.

Inserting a steel ball into the pencil tip. Balls are held on an Alnico magnet until ready for use. Below: Fitting turned point to fountain pen.



The MI Midget will write a heavy line suitable for marking packages.

pencil for a loose fit. Now, using a large bur again, grind one end so it's saucer-shaped. The wire is slit with a number 84 Delta blade, making a cut about .008 in. wide. Do the work slowly and watch it with your magnifying glass. Then magnetize the wire and using pliers, squeeze the uncut end so that it well be flattened slightly and gripped by the lead-propelling chuck mechanism when it's inserted in the pencil. Insert one of the 3/64 in. chrome alloy steel balls into the tip and it will be attracted to the end of the magnetized feed. The turning anvil is pressed over the tip and revolved so as to turn over the tip aperture, so that about half the ball will project. By adjusting the propel-repel mechanism, exact micrometer adjustment and positioning of the point is possible at any and all times! It is advisable to use a small metal pencil point protector on the pen when it is pocketed. The Loc-point feature is made by making the tip aperture smaller, so that the ball is trapped and only about a third of it can project. A slight turn to the right will lock the ball so that it cannot turn and ink won't feed from it. A turn to the left of the pen renders it ready for use. By retracting the ball a short distance the pen can be filled with ink through the tip using a medicine dropper and pressing the mouth against the pen tip. Remove the eraser from the other end of the pen so that it can be sealed with clear nail polish or DuPont Household Cement. The regular model is sealed at the end and around the edges so that the mechanism cannot be turned after having once been set. Put a drop of the sealer over the opening at the end of the pen only, on the Loc-point model.

The "fifty-cent" model consists of an Eversharp Reload Cartridge, a piece of plastic beanshooter tube, pencil clip and a 1-mm. chrome alloy steel ball. Your first step is to remove the paper sleeve from the ink cartridge, also the cap, being careful not to let ink seep from an air hole in the side which may be temporarily sealed with Scotch tape. Cut off the closed end of the cap so that it becomes merely a sleeve, part removed being indicated by the dotted lines shown in Fig. 2. The tip of the cartridge is

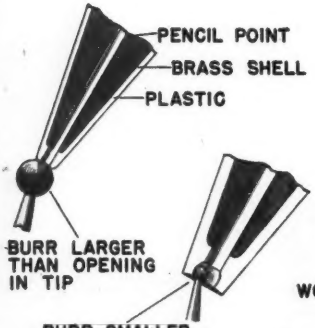
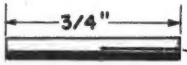
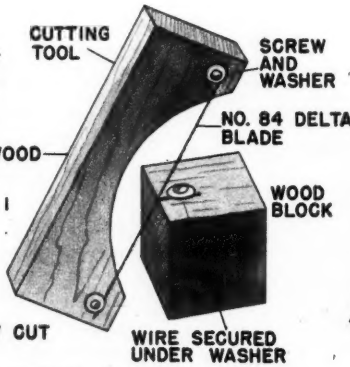


FIG. 1



CAPILLARY FEED MADE FROM STANDARD PAPER CLIP WIRE (MAGNETIZE)



CUTTING CAPILLARY FEED

BOLT ANVIL

about the same as that of a Scripto pencil and it has a capillary hole leading to the ink supply. With one of the smallest burs (1-mm. plus), gently enlarge the hole so that it will form a socket for the ball.

Blow out any chips, then make sure the ink is flowing by unsealing the air hole. Next, place the steel ball then turn and press the anvil tool gently until the ball is secured. Install the cartridge in the plastic tube, add the pencil clip and seal the open end with a button cut from a plastic toothbrush. When the cartridge is empty, open the sealed end and refill it with MInk.

Converting your fountain pen to a ballpoint model is easy. Just remove the nib and feed from the pen and install a ballpoint tip turned from brass (See Fig. 3). Use a No. 80 drill to make the capillary hole and install a 1-mm. or 3/64 in. steel ball as described in making the "fifty-cent" model. An alternate method, to use with a 3/64 in. ball only, is to remove the tip from a mechanical pencil and fill the interior completely with a permanent plastic such as Cascophen Resorcinol Resin Glue. Then drill the capillary hole and install the steel ball as previously described. The base of this point will usually fit the body of the old pen. If it doesn't alter one or the other.

The marking pen model consists of an empty rifle cartridge adapted by forcing a steel ball of the required size into the mouth, as shown in Fig. 4, to form a socket. It will be necessary to work the ball in and out a few times so that it will become seated and so that it can turn freely. A larger anvil than that described is required to turn over the writing point, but if you have access to a lathe, the edge can be turned while the cartridge is revolving, by pressing with a smooth metal tool. The method of filling cartridge with MInk is by removing the screw in the primer end. •

MInk Formulas

These inks are the result of considerable research. It was found that letterpress printing inks are suitable for ball point pen use by the addition of a combined lubricant and plasticizer. Formulas including this discovery have been adopted for MInks because of the ease with which the materials can be obtained locally by readers of MI.

Fawcett Blue MInk

IPI Everyday Blue Printing Ink.....12 grams
Castor Oil .....1 cc.

Essence Of Midnight MInk

IPI Everyday Blue Printing Ink.....8 grams
IPI Everyday Black Printing Ink.....4 grams
Castor Oil .....1 cc.

Washable MInk

Ultramarine blue, ground in oil.....9 grams
(Obtain from paint store)
Castor Oil .....3 cc.
Beeswax (unbleached) .....3 decigrams

Luminous MInk

Luminous Pigment .....10 grams
(Obtain from Standard Science Supply Co., Chicago 22, Ill.)
Castor Oil .....1 cc.
Grind the pigment in a mortar with sufficient oil to make a smooth, thick ink. Writing done with this ink will glow for 24 hours after exposure to light.

Ultra MInk

Visible only under ultra-violet light
Fluorescent Printing Ink.....12 grams
(Obtain from Black Light Products, Chicago, Illinois)
Castor Oil .....1 cc.

Invisible MInk

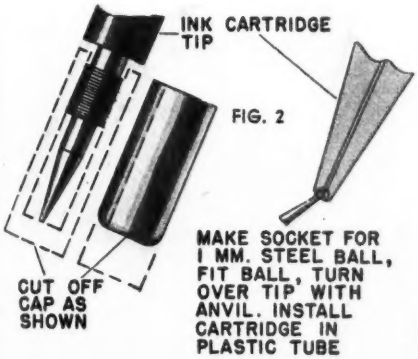
Printing Ink Base.....12 grams
(Ink without pigment, obtained from local printer)
Castor Oil .....1 cc.
INVISIBLE MInk writing is invisible and undetectable until developed. Developing consists of shaking powdered graphite over the invisible writing, which will then immediately appear.

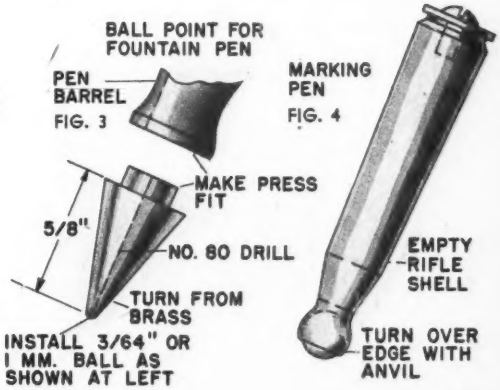
Copying MInk

For hectograph and ditto duplicating.
Glycerine .....10 cc.
Methyl Violet .....2½ grams
(Obtain from drug store)
Soap Chips (Lux) .....½ gram
Dissolve in order named.

Mitallic MInk

Shellac, liquid .....5 cc.
Alcohol, denatured .....4 cc.
Aniline Red .....1 gram
Add a drop to FAWCETT BLUE OR ESSENCE OF MIDNIGHT Mink to give them a distinctive, metallic appearance.





KEEP 'EM CUTTING

BY E. WALTNER

Contrary to what most people think, dull tools are much more dangerous than the sharp ones.

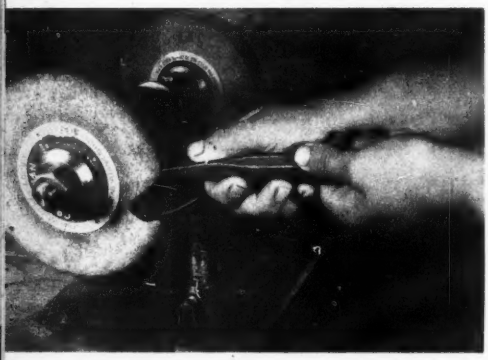
EVERYONE will agree that for maximum efficiency, small hand tools should be kept sharp. But, many of us are at a loss for the approved procedure to sharpen such tools. Remember, if sharpening is not properly done, the cutting edge will be in worse shape than before.

Cold Chisels. For best cutting, a cold chisel should have a bevel of about 70°. A template for testing the bevel, may be made from a piece of tin, see drawing. When the chisel point fits the notch, the grind will be correct.

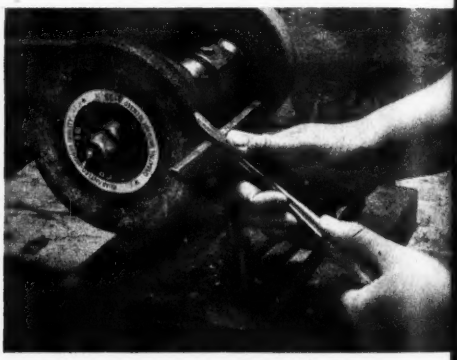
Any nicks in the edge of the chisel should first be removed before any bevel grinding is begun. After squaring off the edge, proceed to grind the bevel from both sides until the bevel of the chisel matches the template.

Wood Chisels. A wood chisel should first have the cutting edge ground off at right angles to the edge of the chisel to the depth of any nicks. Place the chisel on the tool rest, bevel side up, to do this. Move the chisel back and forth across the grinding wheel. This wears the wheel down evenly and at the same time gets the edge of the chisel square.

The actual sharpening of the chisel, is done on the beveled side. A long bevel is useful for paring work, while a short, thick edge is best for mortising. For general work, a ¼ in. bevel is satisfactory. After raising the chisel from the grinder to inspect the work, be careful to replace



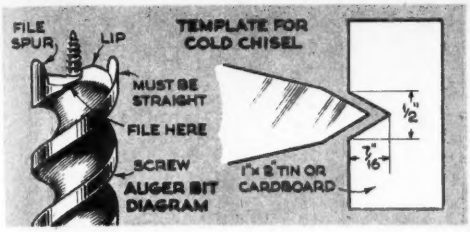
The first step in sharpening a cold chisel is to grind down far enough to remove all nicks. A template should be used to get a bevel of 70°.



Putting an edge on a wood chisel. Move the tool back and forth across the surface of grinding wheel. This prevents uneven wear on wheel.

Getting final cutting edge on the chisel with an oilstone. A few strokes with chisel flat on stone and bevel side up, will remove wire edge.

Grinding a cutting edge on an ax. Thick edge is best for splitting; a thin edge is preferable if you are going to use ax for chopping.



The sketch at the left shows the tin or cardboard template to be used in getting the proper cutting angle on a cold chisel.

it at the same angle against the wheel. Do not use a heavy hand in holding the chisel against the stone as excessive heat will ruin the temper. Keep the chisel cool by dipping it in water occasionally. Continue the grinding until the bevel edge is turned and a "wire edge" shows. After grinding is complete, the tool is brought to a cutting edge on an oilstone.

Knives. A dull butcher knife is the abomination of every cook, so this most useful of household implements should not be neglected during your sharpening spree. Remove any nicks from the edge by placing the knife flat on the tool rest and holding the cutting edge lightly against the wheel, grinding back to the depth of the nicks. To sharpen, hold on the grinder so that the grinding is done diagonally, away from the handle and towards the cutting edge. Move the knife lightly along the stone to keep cutting edge from becoming overheated.

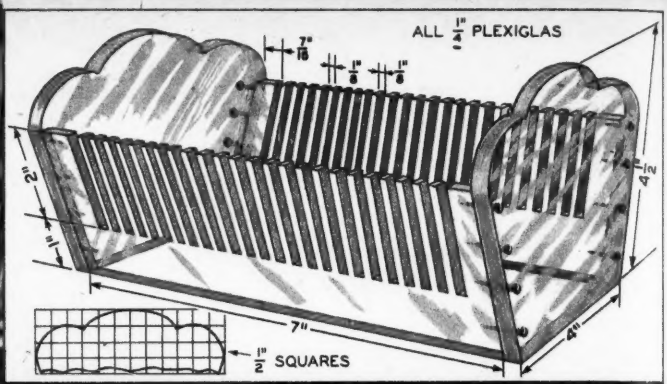
Scissors. Scissors, like knives, have a habit of becoming dull. For grinding these, a fine stone is preferable to a coarse one. The angle at which to hold shears against the grinder, is important. Hold the shears against the stone and observe the angle of the original grind. Usually a single draw across the stone of each blade is sufficient. Remove the wire edge by honing with an oilstone.

Augers. Auger bits should be well cleaned to remove any rust or dirt, before sharpening. Coat a section of rope with valve grinding compound. Place the bit in a vise, wrap the rope around the bit and draw it back and forth. For sharpening bits, a flat, thin file is used. Lay the bit flat on the bench and file off any parts of the spur that have been bent outward. Be sure that the file rests flat on the bit. The next step is to file the spur to an edge. Hold the bit in the position illustrated and file the inside of the spur at the cutting edge. Note that the cutting lips are shaped like wood chisels, one side is straight and the other beveled. File the top or the front of the cutting lip flat. To get the proper angle on the cutting lip, compare it with the bevel on the lips of a new bit. •

Sharpening the trusty kitchen knife. Remove knicks first and then get a cutting edge by holding knife at a slight diagonal. Make sure that the knife is not overheated.

A fine stone is preferable to a coarse one when sharpening a pair of scissors. Check the angle of the original grind before starting.

Filing the spur on an auger bit. File off any parts of the spur that have been bent outward. Always remove dust and dirt before sharpening.



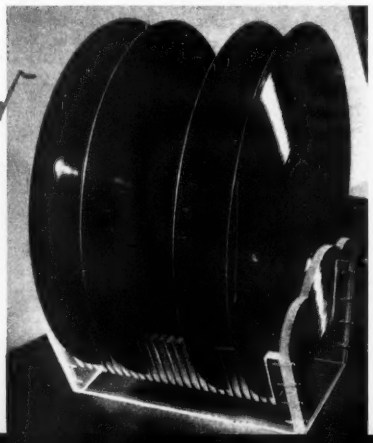
Plastic RECORD RACK

Need more room for Bach or Bing? The answer's simple, the cost is small—here's a rack that holds 'em all.

WELL, maybe not quite all of the disks in your collection but it will take 25 or 50 (if you double the length) of your favorites and keep them ready for instant playing. Though the original model being exhibited by the music lover was designed to hold ten-inch recordings, you can store twelve-inch numbers by simply increasing the height of the end pieces. Plexiglass or any other clear plastic is the material that gives the rack its modern touch and makes it an attractive addition to almost any room. The thickness is ¼ in., as anything lighter would warp and bend under the weight of the disks. To start the ball rolling, lay out the parts in pencil on the masking paper of the plastic. Follow the pattern and dimensions in the drawings and don't forget to allow for the saw thickness between lines. Cut the straight lines on a circular saw and the curves on a band saw. The comb-like teeth that hold the records, are scored on the circular saw, using a blade with as many teeth as possible. In fact a metal cutting saw three to four inches in diameter with fine teeth will give you a smoother cut and require less finishing later on. As the average disk is about 5/64th's thick, make your cuts 3/32 or even ⅛ in. wide.

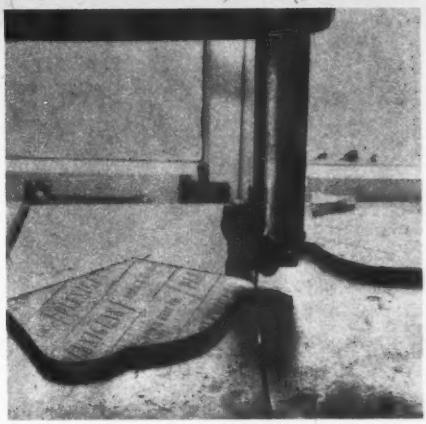
When all the pieces are cut to shape and the edges polished, lay out the holes for the machine screws that hold the rack together. With the two end pieces clamped together and held in a vise, use a No. 50 drill for the holes. These should be tapped

7 Teeth of the rack should be carefully polished to avoid scratching disks.



6 Rack is assembled with 2-56 brass machine screws tapped into sides.

1 **Parts laid out on masking paper of Plexiglass. Allowance should be made for cuts.**



2 **Plastic should be cut slowly on a band saw, and successive cuts made for each curve.**

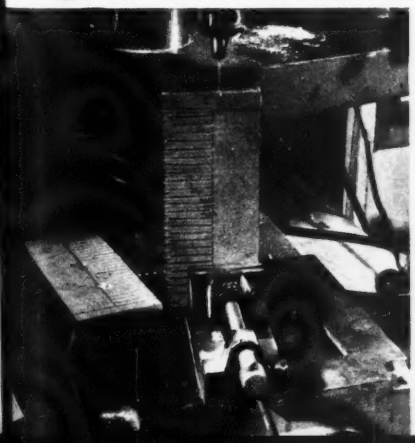
very slowly, going back and forth so the chips come out each time and don't break any of the threads in the plastic.

After all the holes are drilled and tapped, polish the edges with fine sandpaper followed by jeweler's rouge. This will give a two-tone effect quite similar to glass. You can now go to work on the rough edges between the teeth of the side pieces. These should be carefully polished with fine grit paper so there's no possible chance of their scratching the records. Following this, remove the protective paper and give the plastic a gentle polishing with a soft cloth.

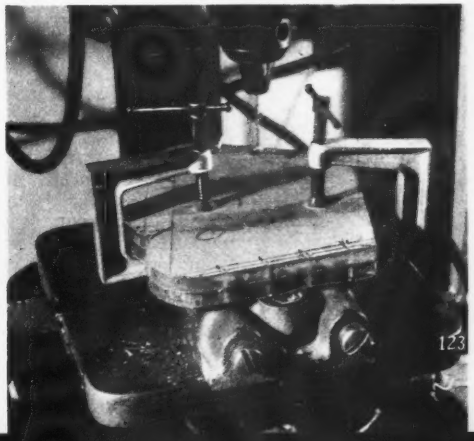
In assembling the rack, be sure that the low part of the circular saw cuts in the sides are *inside* the stand so they form a rounded spot for the disks. If you want to add to the decorative value, you can carve the plastic with a Handee or Vibro-tool. —*J. Von Miklos*

3 **Scoring the sides on a circular saw. Slots should be ⅛ in. wide for loose fit of disks.**

5 **Drilling the side pieces before tapping. Note use of vise to hold work.**



4 **End pieces clamped together and being drilled prior to assembly. Holes are made at slow speed.**



Building the *Victory* One-design

A new 18-ft. Racing Class with simple, all-plywood construction, designed by William F. Crosby creator of the famous Snipe Class.

THE primary purpose of a one-design racing class is to have all the competing boats as closely alike as possible so that the winning skipper finishes first, not because of finer hull lines or a more expensive craft but because of superior skill and seamanship. This is the most democratic form of sailboat racing and one that offers healthful relaxation to everyone of almost any age. For the youngsters or the beginners in boating, one-design competition is the finest training in mind and muscle that can be found. (Ed.: See Mr. Crosby's article on One-design Racing on pages 132 and 133, for more information.)

While the Victory is ideal for day sailing or general knockabout use, you'll get the most sport and find the boat at her best when she's racing with others of her class. So show these plans to your boating friends, talk it up and get them interested in building a fleet of Victory's. By building several boats at the same time, you'll not only get more fun out of racing them but by combining orders for the materials you can reduce the cost considerably.

Now let's take a look at the plans and see what the Victory has to offer. The drawings show a hull that's 18 ft. 3 in. overall with a 6 ft. 6 in. beam and a draft of 3 ft. with the centerboard down and only about 7 inches with the board up. Without rig or centerboard, the Victory should weigh about 450 pounds and complete ready to sail somewhere around 550 (less skipper and crew).

Before getting down to the actual construction, a word about the plans. Not only will you find them simple and easy to follow, but you won't have to worry about laying down a complete set of full-size lines or work from a table of offsets. While the offsets have been included, they're only for the purpose of measuring completed boats before racing—you don't need the table to build Victory. Almost every part of the boat can be drawn full-size directly on paper patterns by following dimensions on the

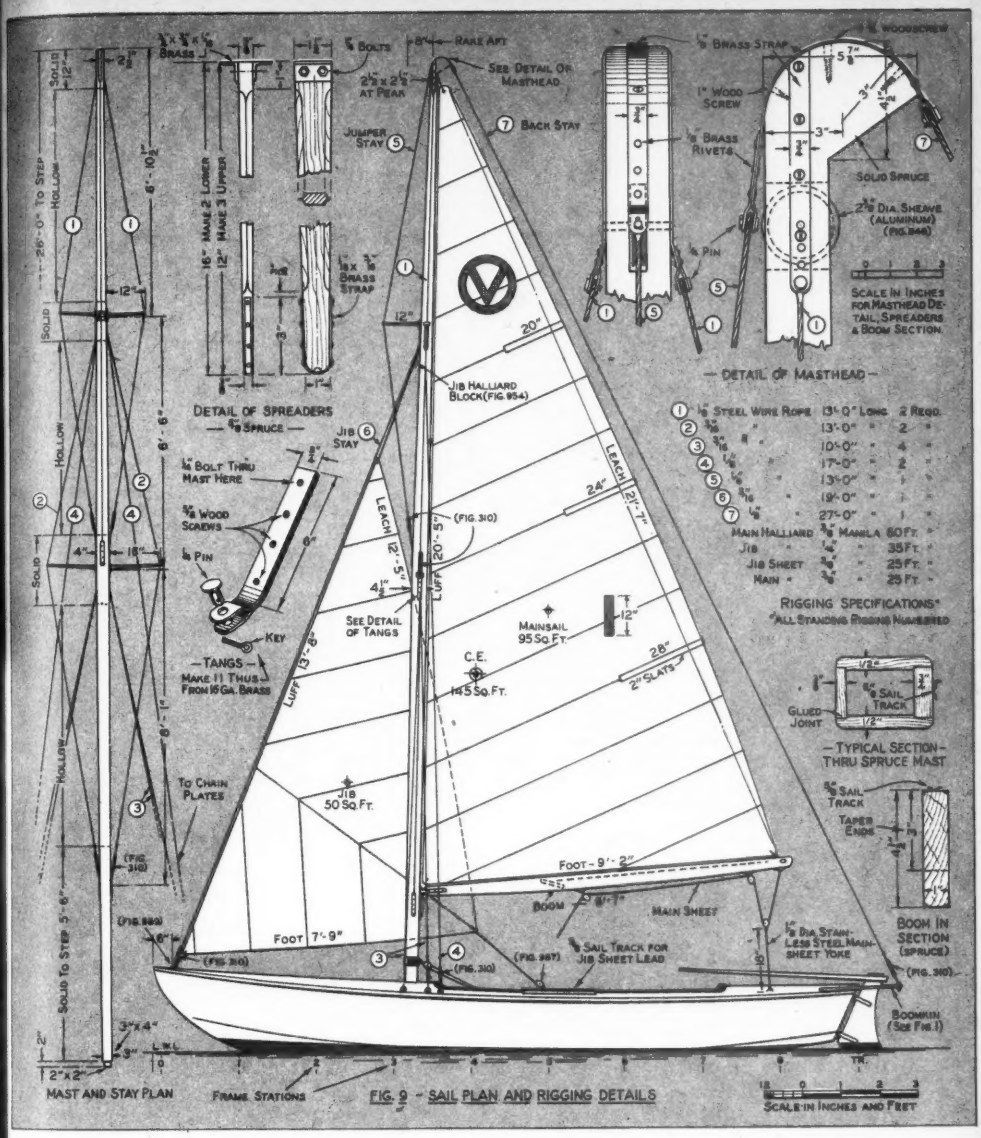
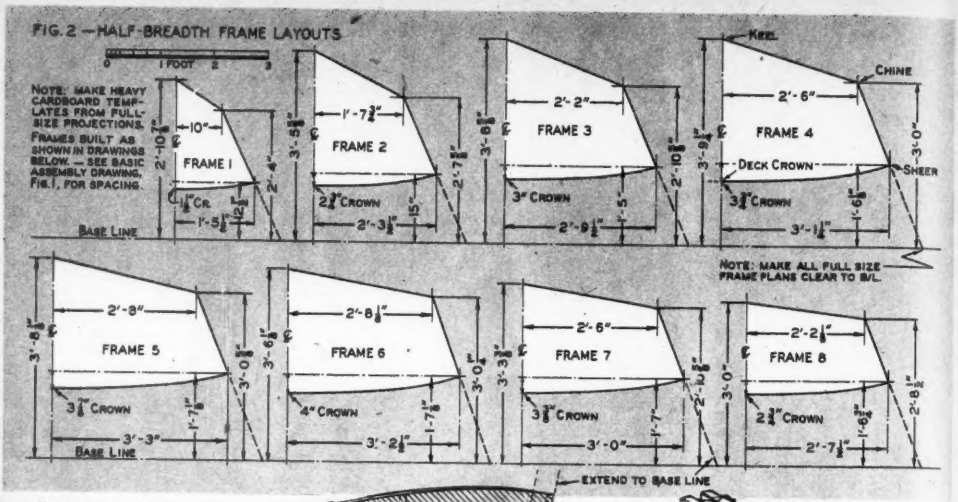
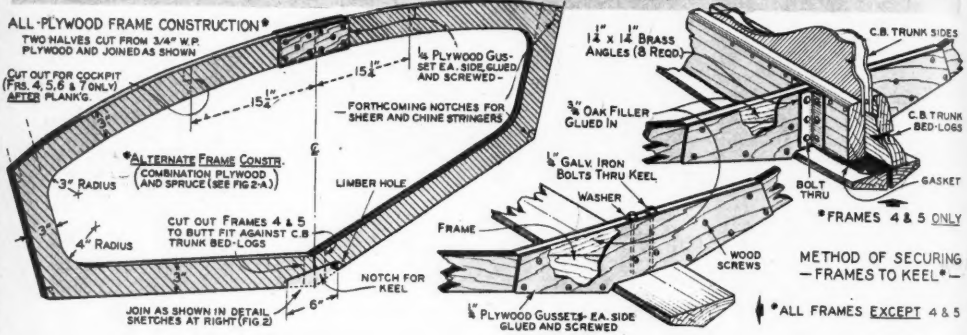


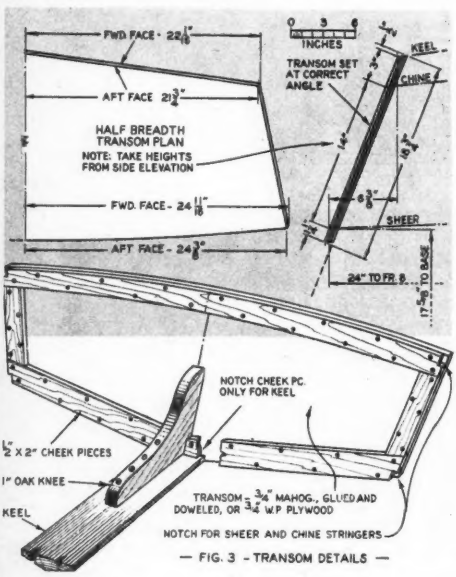
FIG. 9 - SAIL PLAN AND RIGGING DETAILS

plans. Because of the lack of space, these appear in reduced form on these pages. You'll find the work a lot easier by using the large-scale working blueprints of Victory which are available from the MECHANIX ILLUSTRATED Reader Blueprint Service.

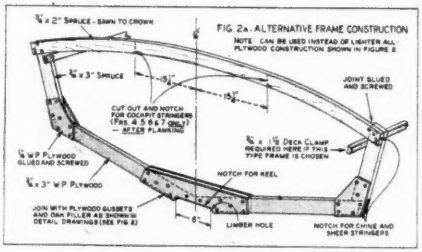
Assuming that you're past the "dreaming" stage of planning and have filled the bill of materials, your first operation is to construct the building form for the keel and framing assembly shown at the top of Figure 1. This form helps to simplify construction and also enable you to build most of the boat upside down, making it easier to frame and plank. After you've snapped down a baseline on the floor, erect the building form (the tops of which are beveled to form the curve of the keel) and be sure to brace the vertical members so the whole affair is absolutely square and rigid. This is important if you want to get the lines of your boat right. Following this, lay out the shape of the stem on heavy







— FIG. 3 - TRANSOM DETAILS —



cardboard then cut it out from two layers of ¾ in. plywood, glued and screwed together. The keel is made next and notched into the stem, using bolts to secure them together. Now, with "C" clamps, fasten the keel to the building form and nail or screw the end of the stem to the 2 by 6's on the floor. Making the transom is your next step and in doing this follow the construction details in Figure 3 *exactly*. The angle at which the transom sets is very critical and if you don't get it right, the boat will be hard to plank and you may have bumps or hollows in it between Frame 8 and the

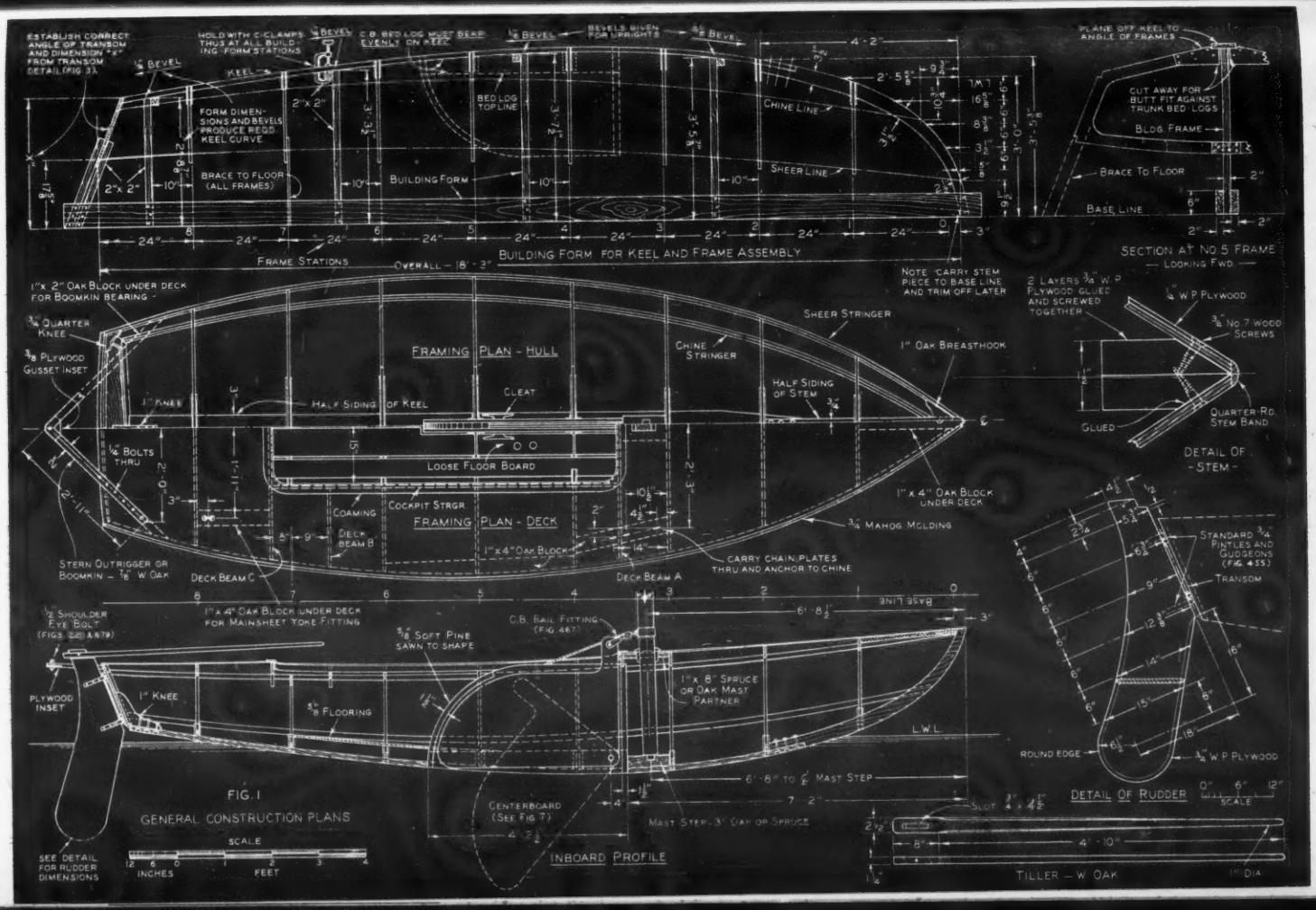


FIG. 1
GENERAL CONSTRUCTION PLANS

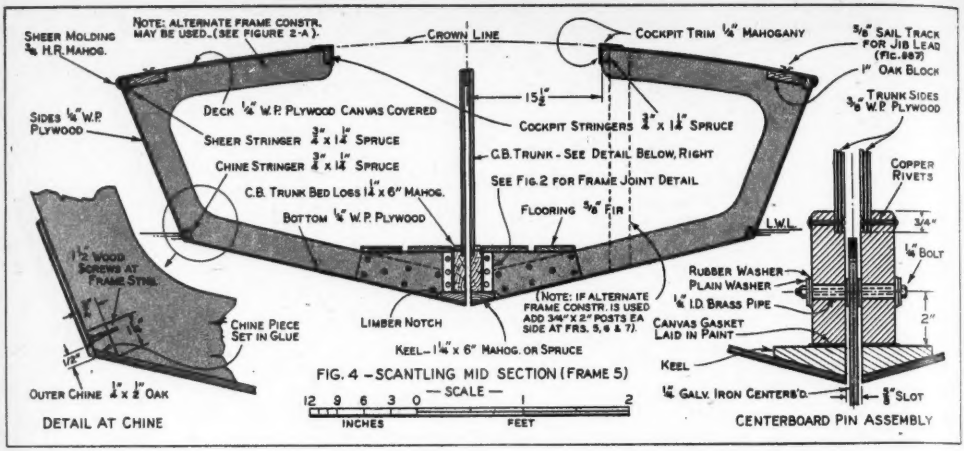


FIG. 4 - SCANTLING MID SECTION (FRAME 5)

transom. When you're sure the 2 by 2's that hold it in the building form are at the right angle, bevel off the end of the keel to fit the transom and fasten it in place. The oak knee should be screwed to the inside face of the transom and bolted to the keel.

The next members to be made are the frames. And here you have a choice of two forms of construction. The all-plywood frames shown on Figure 2, consist of two halves joined at the deck and keel by plywood gussets. These are lighter and stronger, but require more plywood, than the alternate frame construction shown in Figure 2A. The latter use solid spruce pieces at the deck and sides with a plywood floor timber at the bottom, all joined together by plywood gussets at chine and keel. While these are heavier, they're a little easier to make than the all-plywood frames. Whichever type you select, start off by laying the frames out full-size on heavy cardboard, following the dimensions in the upper part of Figure 2. Each complete frame on both sides of the centerline should be laid down and the parts including the oak filler blocks and plywood gussets, assembled directly over the pattern. Dimensions of all frame members are indicated on Figure 4 for the all-plywood type and Figure 2A for the alternate construction. As each frame is finished, cut the notches for the

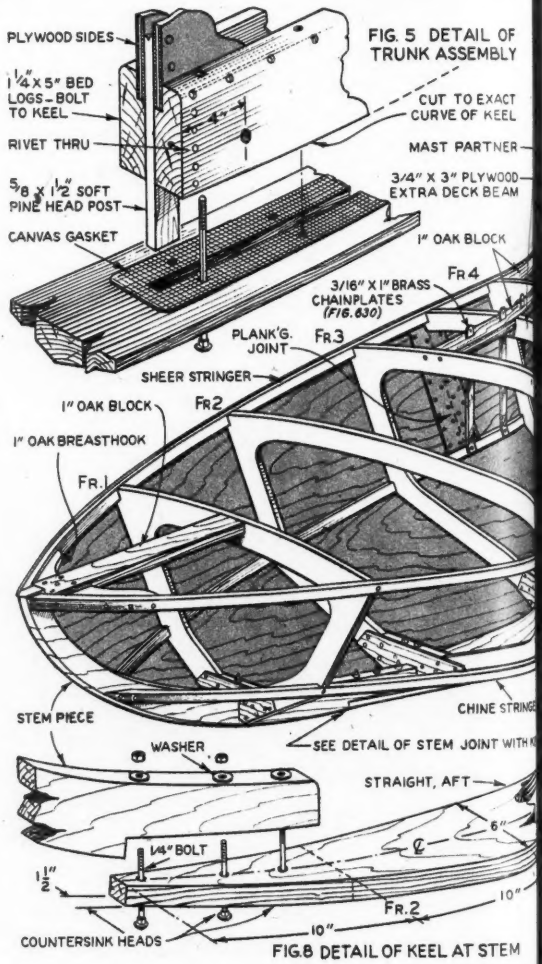


FIG. 5 DETAIL OF TRUNK ASSEMBLY

FIG. 8 DETAIL OF KEEL AT STEM

keel, sheer and chine stringers. In notching Frames 4 and 5 for the centerboard trunk, take the cross section of the trunk from Figure 4 and lay it out full-size on the pattern so the notch fits over it exactly. The ends of these frames butt against the bed logs and later on are fastened to it with small brass angles as shown in the detail drawing at the bottom of Figure 2.

Before fastening the frames on the keel, study the hull framing plan and inboard profile (the baseline's at the top on this one) so you have a clear idea of the construction. Then mark off your stations (the places where the frames go) on the baseline according to the distances given. When you erect the frames in place along the baseline, brace them with scrap lumber

VICTORY BLUEPRINTS
Large-scale prints are an aid in construction. For complete information, turn to page 160.

nailed to their upper ends and set up each frame to the distance from the baseline (or floor) as shown on Figure 2. Note that Frames 1, 2, 3 and 4 are set up with the aft face exactly on the station line while Frames 5, 6, 7 and 8 are erected with the forward face of each *behind* the station line. This makes it easier to bevel the frames. However, before you tackle the bevelling, make absolutely certain that the frames are exactly spaced, square and plumb. After you've carefully checked this, bolt the frames to the keel and stem. In doing the bevelling, use a sharp plane and spring a

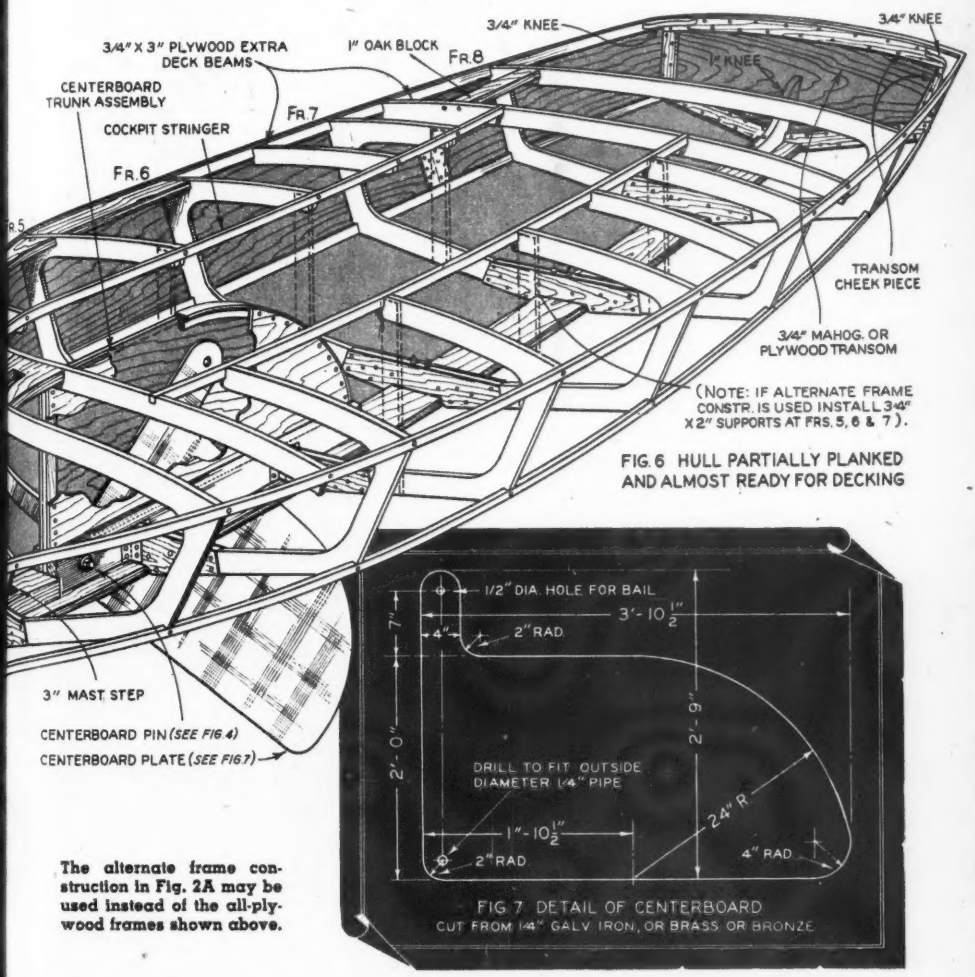


FIG. 6 HULL PARTIALLY PLANKED AND ALMOST READY FOR DECKING

FIG. 7 DETAIL OF CENTERBOARD
CUT FROM 1/4" GALV. IRON, OR BRASS OR BRONZE

The alternate frame construction in Fig. 2A may be used instead of the all-plywood frames shown above.

light batten around the frames to get the correct bevel for each.

The next members to go in place are the sheer and chine stringers which should be screwed into the notches already cut in the frames for them. (You may have to recut these notches to get the exact bevel.) With the stringers bevelled where they fasten at the stem, screw them into the face of it and to the frames, first setting up the joints with a coating of marine glue. When the stringers are in place, cut the bevels on the chine and keel. Lay a straight edge across these two points to get the right angle and then bevel the members for their entire length, using a small piece of ¼ in. plywood to allow for the thickness of the planking. At this point, it's a good idea to fit and screw the oak quarter knees in their places between the transom and the sheer stringers.

From this point on, it will be easier to finish the framing of the hull if it's in a normal position (decks up). So loosen up the clamps, knock off the braces from the frames (don't forget the fastening at the stem) and with the help of a few friends, carefully roll the boat over. While your "helpers" are still around get the hull up on a few low saw horses and then cut the ⅝ in. slot for the centerboard. In doing this, make sure that the sides are parallel and the ends square. While you still have room to work inside the hull, install the centerboard trunk, following the details in Figures 4 and 5 and taking the overall dimensions from Figure 1. The case should fit over the slot exactly and the bed logs shaped to fit the curve of the keel. If you aren't careful with this, you'll have a bad source of future leaks. The soft pine ends of the case should be dipped in heavy paint before driving them home and don't forget to soak the canvas gasket in the same stuff. It's also a good idea to paint the inside of the case before you assemble it completely and bolt the bed logs down to the keel. The centerboard pin assembly can be made now and fitted in the bed logs at the *exact* location shown. Both this point and the mast step are critical ones and unless the plans are followed exactly your boat won't sail properly. If you haven't already ordered the centerboard, do it now so that it will be ready to hang shortly before the boat goes in the water. A bronze board being heavier, is better than brass or galvanized iron.

You can now remove the low horses so the keel will rest flat on the floor while you finish the deck framing, your next job. As most of the deck beams and frames are in one piece (and already in place), this isn't much work. Start it off by making and fitting the extra deck beams, "A, B and C," shown on Figure 1 and the perspective drawing of Figure 6. Get the crowns for these from the nearest frames and after the ends of the beams are notched, glue and fasten them to the sheer stringer on each side. The oak breasthooks and block for the bow chock are made, fitted in place and fastened to the stem and sheer stringers. Make sure that these pieces and all deck framing have the same crown as the nearest frame so that the decking will lay smooth and touch at all points. Next, make and fit the oak partner [*Continued on page* 158]

TABLE OF OFFSETS*

FR. STATION →		1	2	3	4	5	6	7	8	TR
HEIGHTS TO	KEEL	2-10-7	3-5-8	3-8-5	3-9-2	3-8-1	3-6-1	3-3-3	3-0-0	
	CHINE	2-4-0	2-7-5	2-10-5	3-0-0	3-0-8	3-0-2	2-10-9	2-8-4	
	SHEER	1-0-4	1-3-0	1-5-0	1-6-1	1-7-1	1-7-1	1-7-0	1-6-8	1-3-8
HALF BREADTHS	CHINE	0-10-0	1-7-8	2-2-0	2-6-0	2-8-0	2-8-1	2-6-0	2-2-1	
	DECK	1-5-4	2-3-4	2-9-4	3-1-2	3-3-0	3-2-4	3-0-0	2-7-4	

*DIMENSIONS GIVEN IN FEET INCHES AND EIGHTHS TO INSIDE OF PLANKING
— ALL MEASUREMENTS ARE FROM BASE LINE UP OR FROM CENTER LINE OUT —

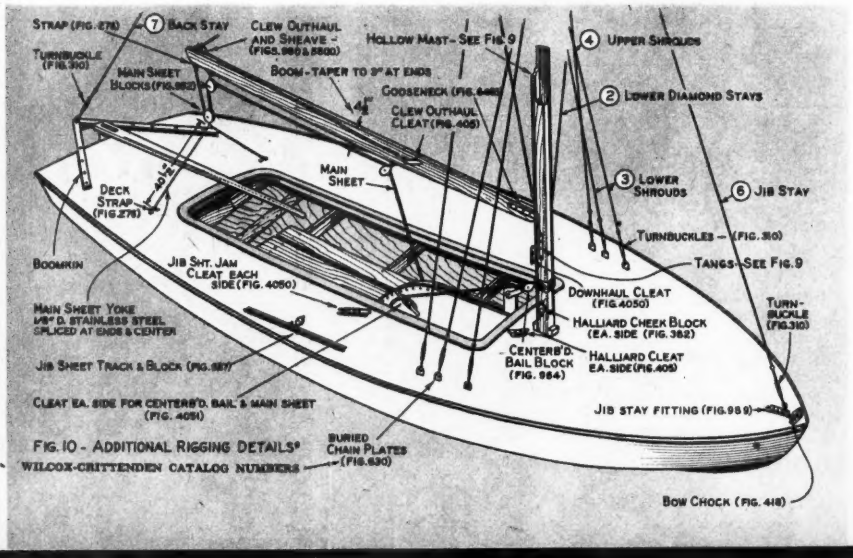


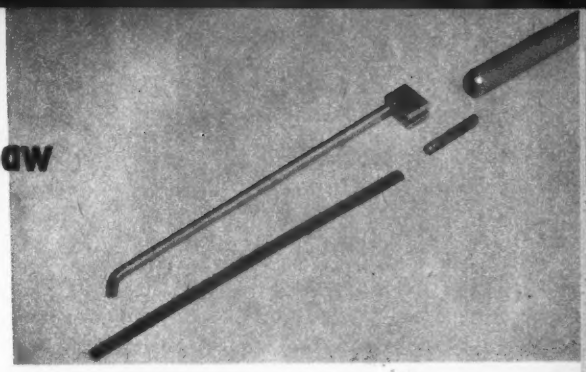
FIG. 10 - ADDITIONAL RIGGING DETAILS*
WILCOX-CRITTENDEN CATALOG NUMBERS

Close-quarter Hack Saw

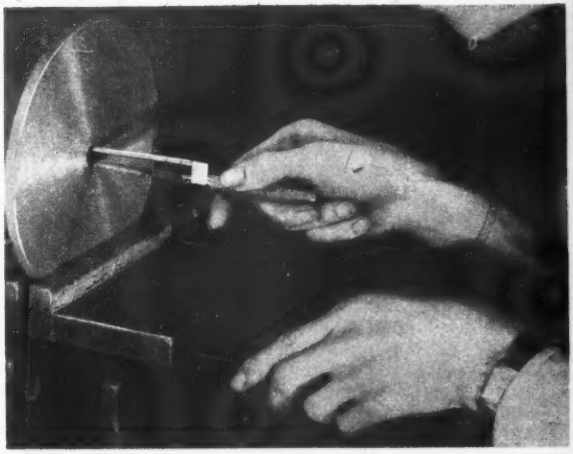
THIS very practical and handy hack saw will find many uses where working space precludes the use of a regular hack saw. Employing a metal cutting jig saw blade, the project should take only a few hours.

The handle is ½ in. cold rolled steel knurled and drilled as shown on the drawing. Using a No. 25 drill, drill the end of the handle while the stock is chucked and then tap 10-24. The handle block is next fashioned from cold rolled steel. Drill the holes as indicated and then file away the top to form a $\frac{1}{16}$ in. wide slot. This slot is for the $\frac{1}{16}$ in. pin extending from the adjusting rod and prevents the rod from turning when the handle is tightened. The hole for the pin in the adjusting rod and the hole for the frame in the handle block are drilled for a press fit.

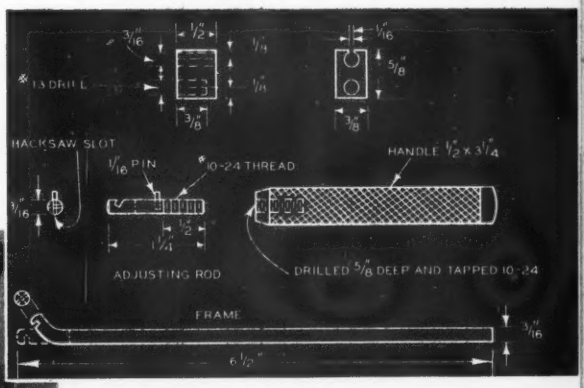
The $\frac{3}{16}$ in. diameter adjusting rod is drilled for the locating pin and slotted to receive the blade. After the tip is slotted, tap ½ in. of the opposite end 10-24. A 6½ in. length of $\frac{3}{16}$ in. diameter drill rod is used for the frame. Drive one end into the handle block and then bend the opposite end, as shown. Slot and notch to receive the blade pin. If a metal cutting jig saw blade is not available an ordinary hacksaw blade can be ground down to size. After the blade is the correct size, drill the pin hole in each tip and then heat this area before pressing the pins in place. The blade is held secure by tightening the handle.—*Harry Hanscom.*

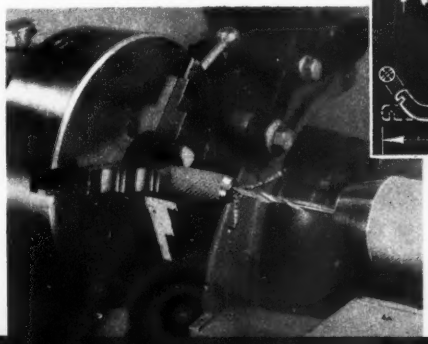


View showing handle block in frame and remaining parts. Note notch in block for adjusting rod pin.



Cutting keyways, where the hole diameter permits, is one use for which this tool is ideally suited.





After the handle is knurled, the end is drilled and then tapped 10-24 to fit the adjusting rod.

Start of a Snipe race at Larchmont. Rosenfeld Photo

boats and boating

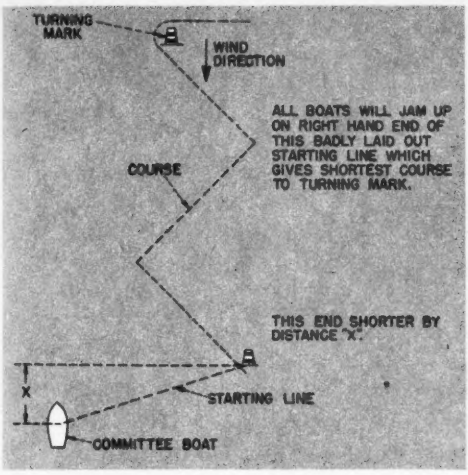
BY WILLIAM F. CROSBY

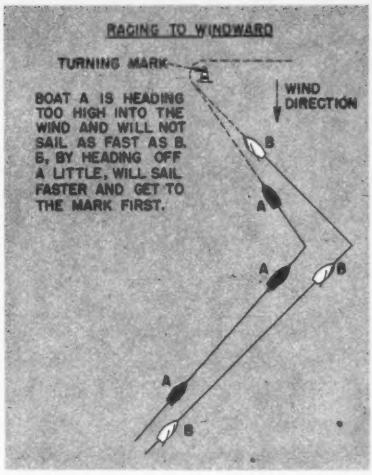
RACING in one-design classes is one of the most highly competitive sports but unlike many others, it requires more than good equipment to sail the winner across the finish line. Not only must the boat be tuned up to peak form, the sails the best obtainable but the skipper's skill in sailing and getting the last ounce of speed from his boat must be developed to the highest possible degree.

Assuming that you know your racing rules thoroughly so you won't be disqualified before you even start, one of the first things to remember is that many a race has been lost because the skipper tried to head too high into the wind on the first leg. By doing this, you may slow your boat to the point where no amount of sailing skill will make up for it later on in the race. Quite frequently a boat will make tack faster if she is permitted to fall off a bit and pass to leeward of a competitor that is heading too high. If the tacking leg is long enough, such a boat may gain enough so that the other craft may never come near again. Any skipper worth his salt knows from past experience just how much to let his boat fall off to accomplish this maneuver.

Two equally important points are at the start and on the windward leg. The reach and the run usually have little affect on the outcome as the boats seldom change position on these legs. In getting a good start, a great deal depends on the conditions. If several races have been run off before the one in which you're entered, follow the boats in them closely and see what their behaviour is at the windward or leeward end of the starting line. Watch the champion of the class (if you can pick him out) and try to remember which end of the line he starts from. Sometimes the starting line is badly laid out so that by starting from one end of it you sail a shorter course, as illustrated in the drawing. If this is the case, you'll know it because of the boats jamming up at the favorable end. When this happens, either try to get a perfect start and be a few feet ahead of the rest or if you're not sure of yourself start a little further down the line to clear the crowd. A large part of skill in racing is to avoid other boats and keep the wind in your sails. Nothing will kill the forward way of your boat quicker than having two or three boats directly to windward, thereby blanketing your sheets. Sometimes a boat with clear wind will walk through a jam simply by taking a course slightly below the others. While the boats in the crowd are fighting it out, the lone wolf gains enough of a lead to decide the race then and there.

Another important point is this. Don't try to start a race by guessing or following the actions of your competitors. Get yourself a stopwatch and set it with the ten minute advance signal. Then check it again with the five minute gun and maneuver your boat so that she goes across the line on the second of the start and under full way. Some skippers get up to the starting line and then luff their





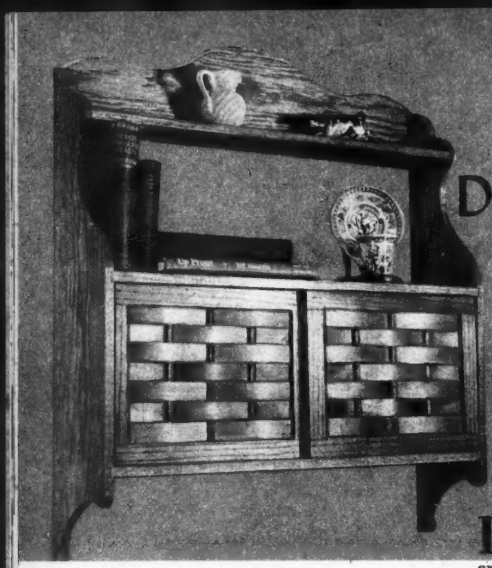
Sailing skill is an important factor in winning races. A veteran skipper tells you how to get the most speed from your boat.

sails there, waiting for the gun. When it fires, they're caught flat-footed without any way while others with all sails drawing cross the line and gain what may be a deciding lead. Remember that the larger your boat is, the longer it will take to get her under way. Even the smaller, lighter boats sometimes get caught in this maneuver and are badly handicapped at the start.

On some days if the wind is right and there happens to be no tidal current, you can sail away from the starting line 60 seconds before the last gun, come about and then hit the line right on the nose. However, this takes skill and practice to avoid hurrying the move and losing valuable time. If you do try this maneuver, make a wide sweeping turn and keep your boat moving all the time.

When the wind is light and spotty, watch out for the smooth spots where there's a dead calm. If you sail into one of these you may sit there for what seems like hours, watching the rest of the fleet sail around the course. Skill in observing weather conditions and interpreting them correctly plays a large part in winning a race. Any experienced skipper will recognize those smooth, glassy spots as traps to be avoided at all costs. He knows that even a light breeze will leave tell-tale ripples or cats'-paws on the water and he'll try to shape his course for these spots. During the summer months particularly, breezes are apt to be light and variable and it takes a lot of sailing know-how to take advantage of every puff of air that comes along. A weather-wise man will watch other boats, some of them far away, to see if the wind is blowing there. Flags ashore or perhaps a large factory smokestack are also good indications of wind conditions. Even a small wisp of smoke may give advance information of a shift in the wind. Usually, the darker the color of the water, the stronger the wind is and it is actually possible to sail a longer course in more of a breeze and travel around a fleet of becalmed racers. Above everything else, remember that the shortest distance between two racing buoys isn't always the quickest path to the winner's cup. •

Inland racing scow on Lake Hopatcong, New Jersey. One of the fastest sailing craft in the world.



Decorative Wall Rack

Is space at a premium in your home? Then build this cupboard.

BY BERTRAM BROWNOLD

IN PRESENT day small homes and compact apartments, built like ships' cabins, storage space of any kind is at a premium. Here is a way to acquire a little space without pre-empting floor area.

The drawing shows dimensions and method of construction. Use ½ in. stock throughout except for the back panel of the storage compartment, which is made of plywood. The sides are jigsawed with the shelves glued into dado grooves. The curved member at the top, and the back panel are glued and nailed into rabbet grooves. Apply the glue evenly in the grooves and when gluing up make sure that the work is square before tightening the clamps.

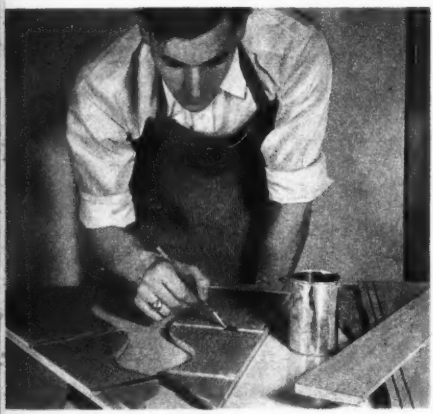
The two lattice work doors have $\frac{1}{16}$ in. brass plates attached to their inner surface. These plates slide in grooves in the facing surfaces of the two large shelves.

Constructing the two lattice work doors is easy. Make the door frames first. They have glued half-lap joints. The horizontal members of the frames have holes in the indicated locations to accommodate ¼ in. hardwood dowels.

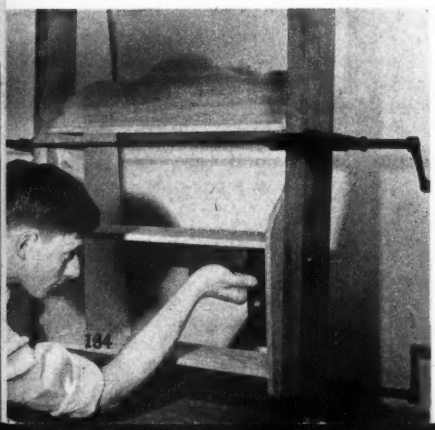
Each door is equipped on its inner surface with four brass countersunk plates. Secure all of the plates in position (despite the fact that it will be necessary to remove them in order to set the doors) and test to see that they do not project too far for the depth of the grooves in which they will slide.

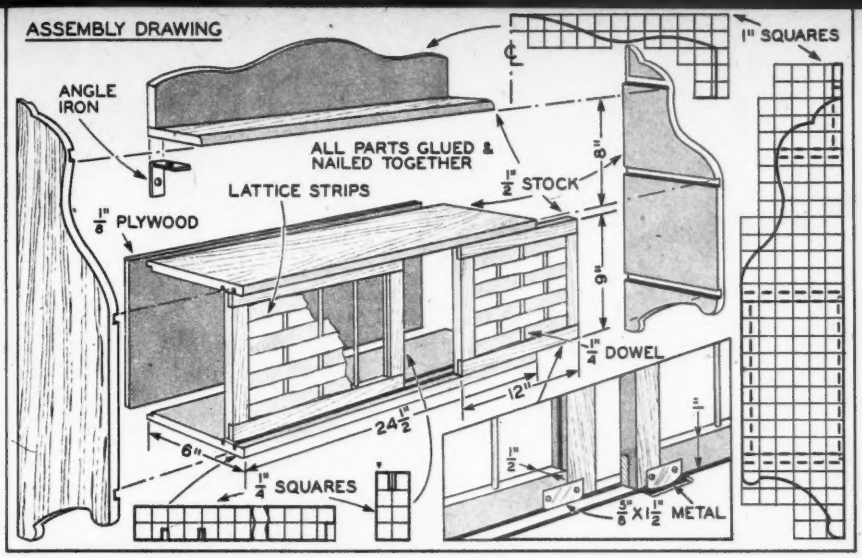
To set the completed doors into their respective grooves, place the front down on the work table and with the back panel off. Secure the top two plates to one of the doors and fit the door between the shelves with the plates in the groove. It then is a simple matter to slip the other two plates into position and drive the screws home. Repeat with door number two and replace the back panel.

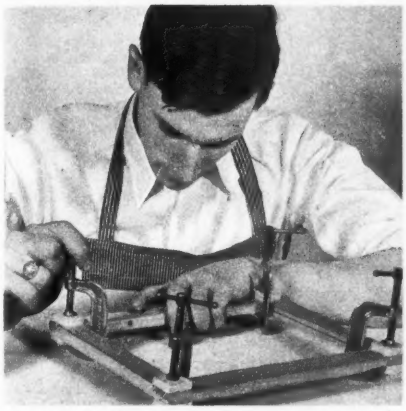
Finish with brown oil stain and shellac. The rack is secured to the wall by corner irons; two under the bottom shelf and two under the top shelf. ●



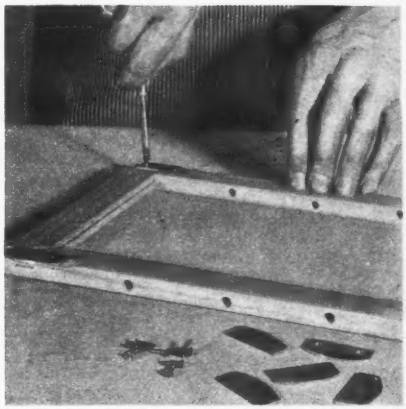
Confine the glue to the grooves as the stain cannot penetrate a glue-covered surface. Below: Be sure the work is square before applying the clamps. The back panel is made of ⅛ in. plywood.





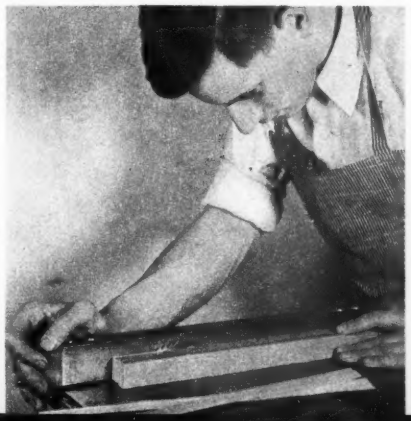


When gluing up the door frames, use small bits of waste wood to protect the work from marks.



Attaching the brass plates; they slide in grooves in facing surfaces of the two large shelves.

The lattice strips are ripped from solid stock. Set the fence about 1/16 in. from the blade.



Soaking the strips in water renders them flexible. Seven strips are required for each door.

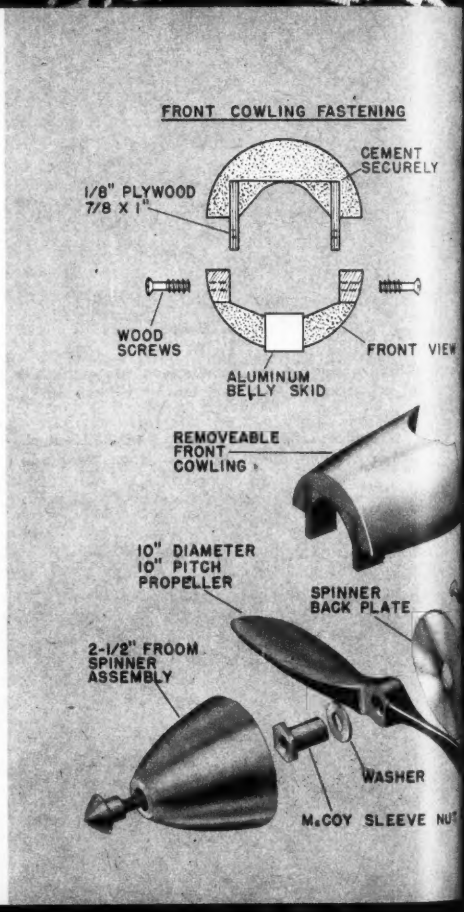
"SHARKIE"

BY RUDOLPH ANDERSON

Prepare for the coming contests with this hot bullet-like Class VI control-line speed job that clocked over 128 mph on its first test hop.

SHARKIE is the culmination of over four years of constant experimenting with Class VI control-line models, and although completed only two weeks before this was written, test flights indicate that it should make itself known in the control-line field. On one of the *first* test flights it turned in an unofficial time of *128.5* miles per hour! This speed, incidentally, was clocked by an AMA contest director and witnessed by several well known model authorities.

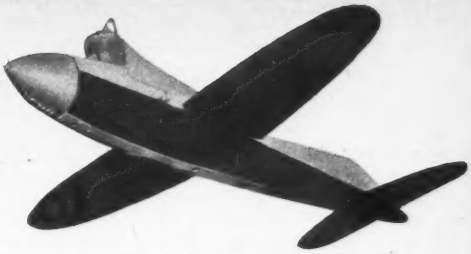
We don't want to appear too proud but if you look over the model you'll probably better understood that the 128 mph test hop was no accident. Streamlining is very clean, with the engine mounted well back,



being fitted with a McCoy shaft extension and Froom spinner. Total weight is slightly under 2½ pounds and despite the fairly high wing loading the model does not "mush." Powered with a stock Hornet, any modeler should be able to clock at least 100 mph, if not more. We recommend the use of either a Hornet or McCoy engine but if you have a Howler, Hassad, Ohlsson 60, Herkimer 60 or Atwood in your job, you'll still move along at a good clip. However, installation of these engines will call for minor structural changes.

Of solid construction, Sharkie has no tricky flight characteristics. The fact that 14-year-old Alistair Fyfe flew it on its maiden flight (after a *hand* launch) sort of proves this point. Beginner or expert, you'll find Sharkie within your scope.

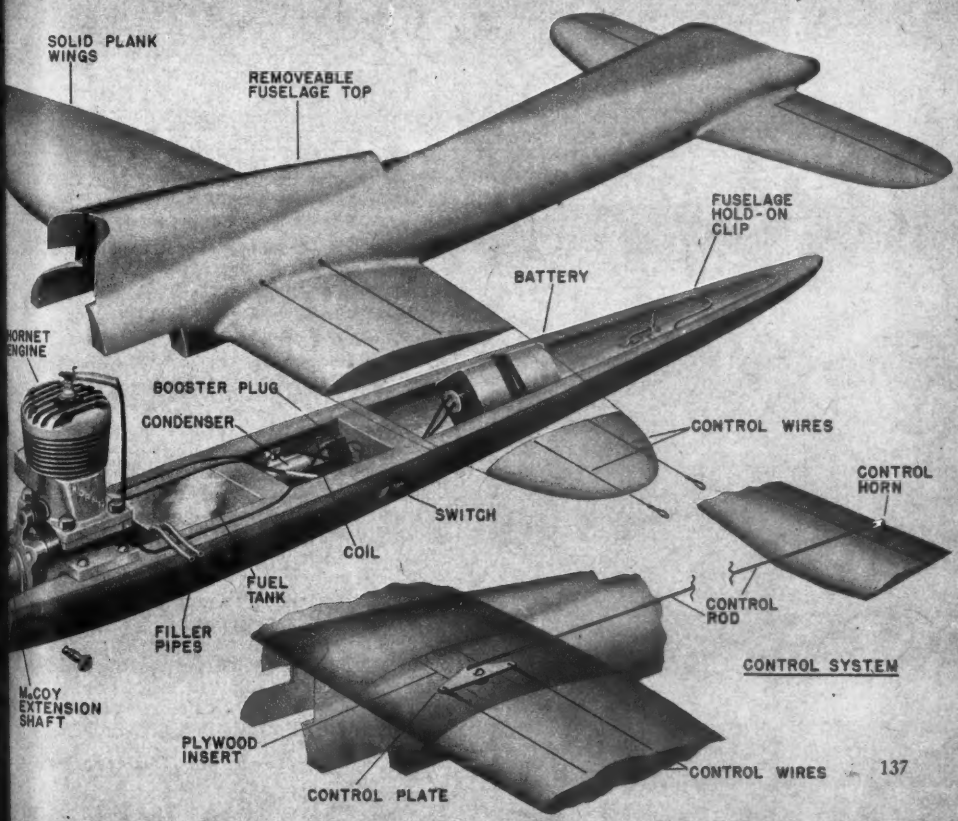
Start construction with the fuselage, which is carved from 3 blocks of medium stock. Trace the side view outline on the lower block and then draw the top view. Next, trace the upper fuselage half outline, which should also include the line for the removable nose section and the wing. Fol-

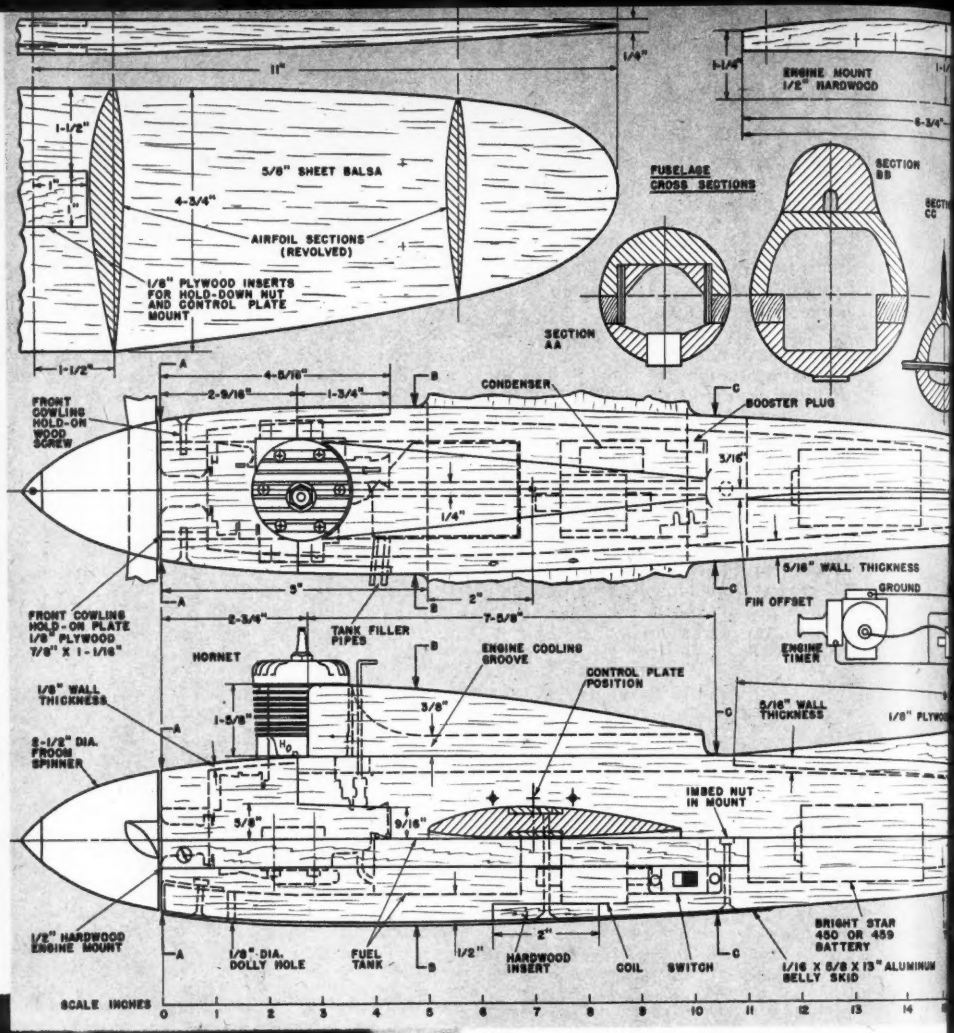


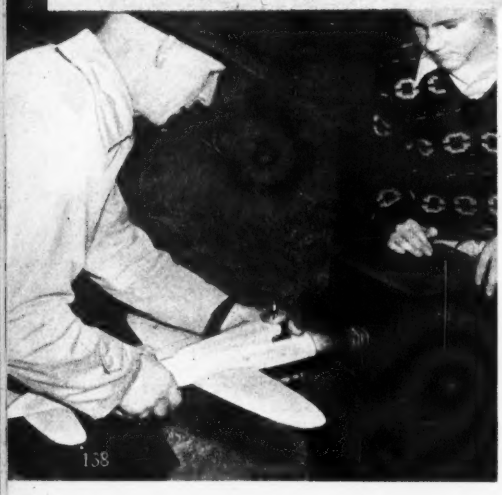
low by drawing the top view and then carefully cut away the nose section, using a hack saw for the two perpendicular cuts and a coping saw for the lenthwise cut. Carefully trim the edges with a razor and spot-cement the nose section back to the upper fuselage block. Next, jig saw the outline for the wing and spot-cement the block back into position.

The upper and lower halves are now lightly-cemented together and the exterior carved to shape. Scribe the 2½ in. diameter circle on the nose grain and then cut the three fuselage templates from stiff cardboard. Carefully carve the corners and trim until the cross-section shape is similar to

Illustrated by Calhoun Smith





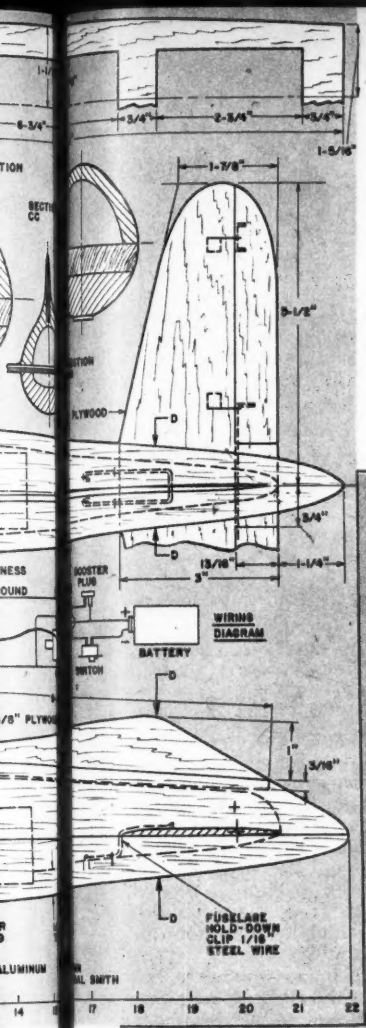


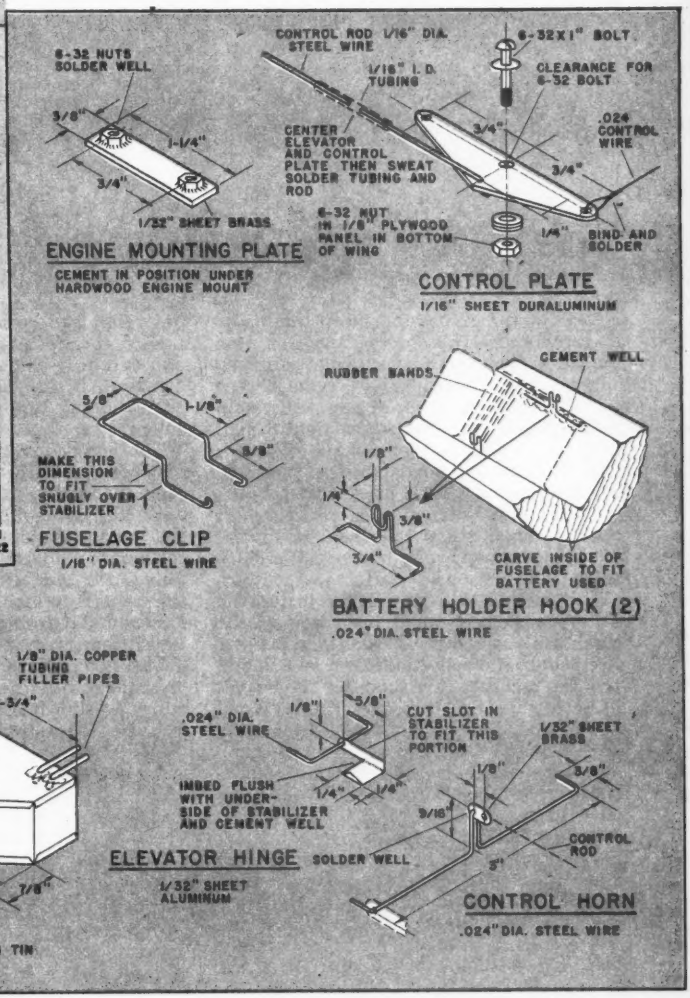
Using an electric starter, designer "Andy" Anderson (left) and Alistair Fyfe prime Sharkie for a hop.

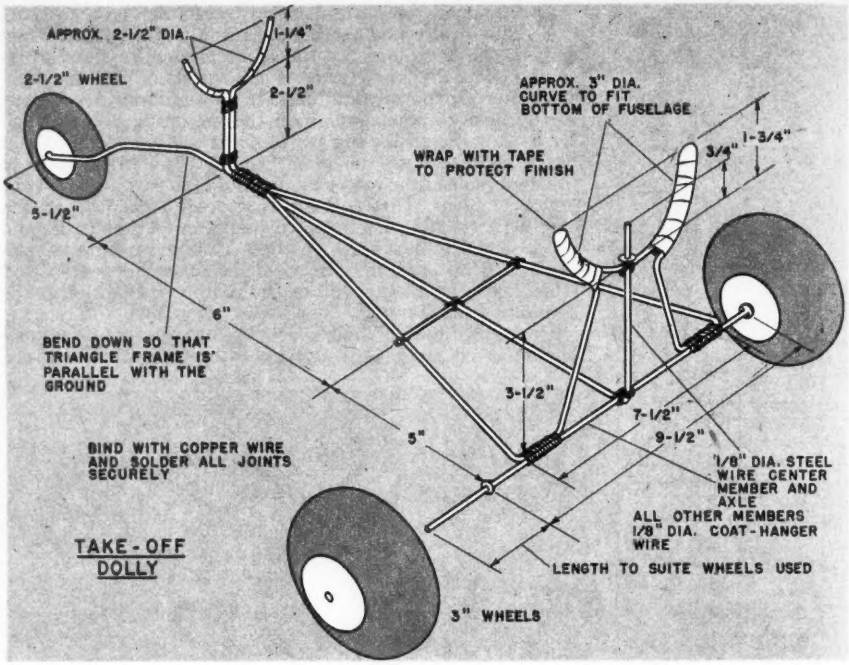
the station templates. Cut the engine fairing and hollow out as indicated on the plan. Cement this block directly to the upper fuselage shell and proceed to shape in the same manner as the upper and lower fuselage shells were carved. Once the exterior shape coincides with the templates, pry apart both halves and proceed to hollow out the interior, using a sharp gouge. When cutting a flat area use a chisel. Consult the side view drawings for the various wall thicknesses. As you will note, not too much of the fuselage is hollowed out; the tremendous abuse and speed makes it necessary to have real durable construction.

The motor mount outline is next traced on a piece of ½ in. thick bass or plywood and the outline cut. Mark off and then drill the engine mounting holes, which are for the Hornet engine. Note that the Hornet shaft mounts a McCoy extension thereby permitting greater streamlining and very sturdy nose construction. With the mounting holes drilled for 6-32 bolts, solder the two nuts to a piece of thin sheet brass, as shown on the plan. Cement the brass plate to the underside of the motor mount and then carefully bolt the motor in place. This will insure correct placement of the engine. After the cement has dried, remove the engine and cut the fuselage to receive the mount. Make certain you trim exactly ½ in. from the top, else the thrust line will differ. If necessary, trim the side of the mount to fit in with the contour of the fuselage.

The upper fuselage half is now hollowed out and the nose section pried loose. Consulting the top view drawings, cut







the top of the removable nose section to fit your motor. The engine fairing is next pried loose and the forward edge carefully hollowed out to fit the rear of the engine cooling fins. Once this is accomplished and the air groove has been cut, cement it permanently to the fuselage shell. The removable nose section is held in place by two 6-32 bolts which pass through the motor mounts and into ⅛ in. plywood squares imbedded in the nose, as shown. Now add the hardwood block in the fuselage bottom.

With the aid of the drawings install the ignition system. Note the position of the switch, coil, condenser, battery and booster plug. Mount the coil, condenser, switch and all wires securely in place after the circuit has been tested and then pack Plastic Wood around the coil. The model is subjected to terrific vibration which often loosens connections, the root of most motor trouble. The pack battery (Bright Star No. 450 or 459. Burgess or General 2B2) rests on a flat area carved in the fuselage as indicated. The battery is held in place with rubber bands.

Groove the motor mounts for the wire leading to the timer and ground so the top of the lower fuselage shell is absolutely flush. The gas tank is made from a few sardine cans, the tin quality of which we have found to be far superior than that of the usual can. Cut out the section as shown and carefully solder. Should you desire, a commercial tank can be used but the engine running time will be cut down considerably.

The wing is next. Trace the top outline on a piece of ⅝ in. thick medium stock and then mark the front view taper. Taper each half, using a plane or wood rasp. Saw the top outline, cut the rib templates from cardboard and proceed to carve the airfoil. Once the airfoil is duplicated, trim the upper fuselage section to fit the wing, exercising extreme care to make certain the surface is set at zero degrees incidence.

The two ⅛ in. plywood pieces are now imbedded into the center section of the wing, as shown. Cut the wing to receive the plywood and allow the cement to dry under pressure. A vise or C-clamp will serve perfectly. After the cement has dried, drill the hole for the control plate bolt and also for the long fuselage bolt that holds the top of the fuselage to the bottom. Imbed the 6-32 nuts into the plywood and cement. Finally, drill the hole for the fuselage bolt [*Continued on page* 160]

FULL SIZE PLANS —See Inside Front Cover

A "spare parts" special for locating and tracing simple defects in receivers.

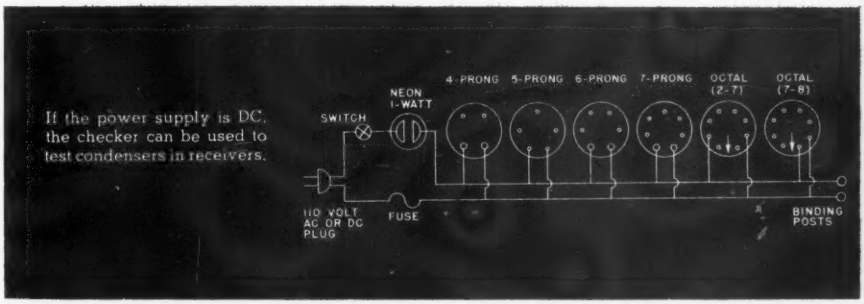
Tube and Continuity Checker

Almost 90% of the trouble in present-day AC-DC sets is caused by burnt out tubes. But locating the culprits is another matter. If the tubes are in series or have a coating on the glass (metal tubes are also tough), a continuity tester is the only solution. This one is simple, easy to make and can be used by your non-technical friends, thereby saving you the trouble of checking their sets.

To build the tester, you'll need the following spare parts: sockets for four, five, six and seven prong tubes, plus two octal sockets, a flush receptacle for the neon bulb, fuse clip, single pole toggle switch and two binding posts. Mount all the parts on a panel about 6 by 9 inches, with the fuse clip on the under side, near the switch. Wire all the filament connections of the tube sockets in parallel with the binding posts as shown in the diagram. The receptacle for the neon bulb should be in series with this socket combination and the power plug, switch and fuse (3 amp type).

When the wiring is completed, plug the unit in a wall socket, snap the switch on and short a wire across the two binding posts. If AC is used, both plates of the neon bulb should light up but if you're in a DC area, only one plate will glow. To test the filaments of a tube, remove the wire from the posts insert the tube in the right socket and if the filament is okay the neon bulb will glow. If the filament is gone, the neon will remain dark. The octal sockets are used for some tubes because filament connections vary. By using a pair of leads with test prods, on the binding posts, the unit can be used to check coils and resistors.

—*H. Hirsch*



If the power supply is DC, the checker can be used to test condensers in receivers.

car care

TIRE PRESSURE. By marking the pressure carried in the tires on the gauge with a line of white enamel, gauge is easily read in dim light.

HERE'S A TRICK that will save bleeding and refilling the braking system when replacing the stop-light switch. First fill the master cylinder's reservoir. Then when you remove the old switch have the new one ready to screw in. Only a small amount of fluid will be lost.

ACCELERATOR PEDAL JUMPY? If so, chances are that the engine isn't firing evenly. Check for a loose spark plug wire, a stuck choke or a sticky valve. If everything seems to be in order you may find the motor mounts loose.

TWO LITTLE STEEL BALLS will fall out of the carburetor when you dismantle it. Both are from the acceleration pump. One fits into the pump inlet; the other into the discharge well.

DON'T WORRY if you jiggle the rubber valve stem of a tire and hear air escaping. This is just air that has been trapped between the tire and the rim. It will be more noticeable if the tires are warm from running.

BURRED TEETH on the Bendix pinion gear will cause jamming. Better replace the whole unit before it starts chewing the flywheel teeth.

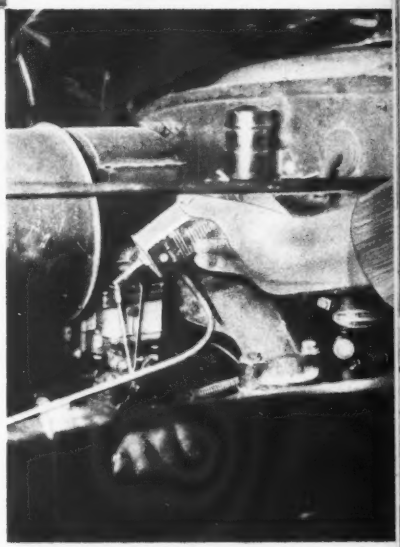
ONE HEADLIGHT OUT? You can decide this point without risking a stop on a busy parkway just by driving up close behind another car. The rear deck will mirror your lights.

TWO SCREWDRIVERS will pry off the most stubborn hub cap. As soon as tip of first screwdriver is in place, follow up with second one.

FENDER EDGE DAMAGE can often be straightened with aid of a monkey wrench. You can then "bump" damaged section with a hammer and block to get a smooth surface. Finish with enamel.

INFERIOR BRAKE FLUID will attack rubber parts of brake system and corrode the master cylinder's piston return spring.

ACCELERATION PUMP ARM is a hard-working part subject to considerable wear if not oiled. Use a high-grade machine oil.



BEHIND THE WHEEL

with Fred Russell

If you want a personal reply from Mr. Russell please include a self-addressed stamped envelope.

I have a 1939 Pontiac with clutch trouble. The gears act as though they were stuck and I sometimes have to kill the motor to disengage them. This happens in first, second and reverse. What's wrong? D. W. Holton, Hollywood, Cal.

Your clutch may be dragging because of oil working through a worn rear bearing. Check to see if the clutch cover is bent. If it is, this will throw the release levers out of alignment. While you're at it, make sure that the clutch housing is properly aligned.

I can't get any speed out of my 1939 Dodge. The points have been adjusted and the carburetor checked. Can you help me out? Joseph W. Winiarski, Essex, Md.

When a car won't go over a certain speed it is a good idea to suspect a weak breaker arm spring. Low carburetor float level will also limit speed as well as a clogged exhaust system. Check for a bent tail pipe.

The gas mileage on my 1941 Ford has suddenly dropped from 20 miles per gallon to 15 miles per gallon. What has caused this sudden increase in gasoline consumption? C. C. Doggett, San Marlos, Texas.

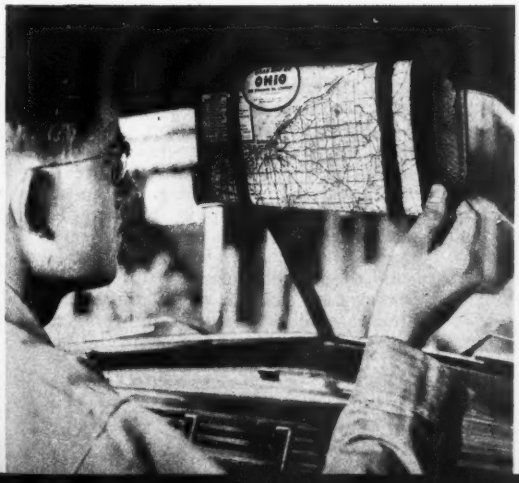
When gas mileage goes into a nose dive I usually suspect a faulty choke valve or gasoline being stolen from the tank. Check also for a leak in the fuel line between the pump and carburetor.

Whenever I stop my 1940 Buick and shut off the motor the pressure throws the anti-freeze out of the overflow pipe. The cooling system has been checked thoroughly. Frank Lintner, Wyandotte, Michigan.

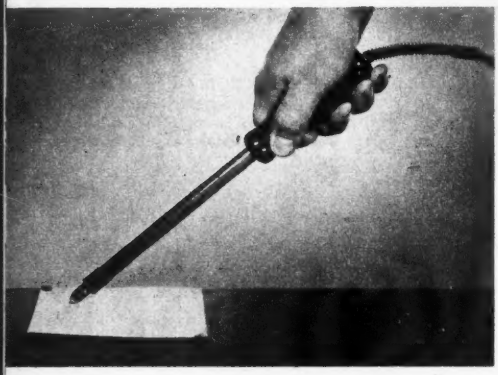
A crack in the cylinder head or a bad head gasket may cause this trouble. Let me hear from you again.

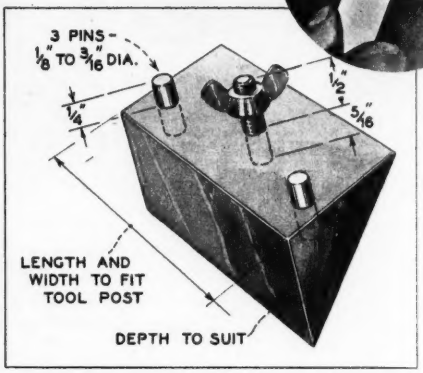
ROAD MAP HOLDER. Below, left: Sun visor can double as a map holder by using a couple of rubber bands. Original function is not affected.

BENT ROOF DRAINS will encourage rain water to leak into the car and corrode the bottom of the door panels, so obvious in many of today's cars.



HOME and SHOP TIPS

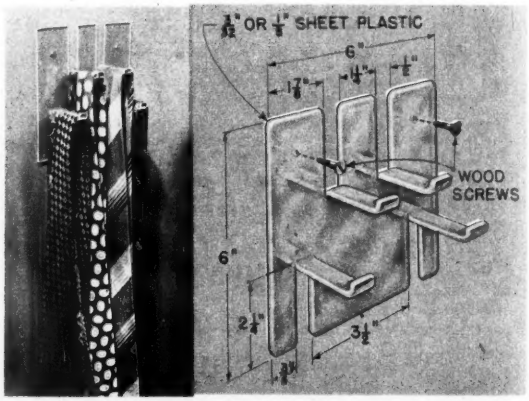




A CLEAN SOLDERING IRON is yours for the rubbing if you tack a small square of sandpaper to the top of the bench. The same dodge is also handy for putting a needle point on your marking pencil or for cleaning the oxide and enamel.

A REST FOR HOLLOW GRINDING of plane irons, chisels, etc. is a "must" item in the shop. This one can be made of CRS or brass with an angle of about 25°. The angle can be determined by making a full-size drawing of the wheel, rest and block.

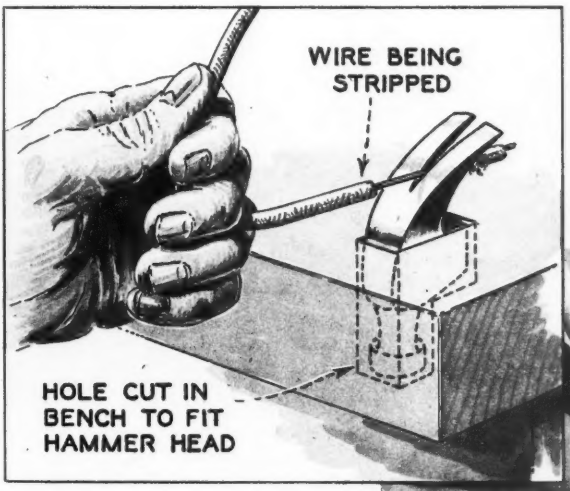
HANDY OILING OUTFIT for small motor bearings and other tight spots consists of a bottle, cork, needle or wire and eye dropper. The wire is stuck in the cork and used for small oil holes while the dropper takes care of larger ones that require more oil.



THIS PLASTIC TIE RACK has no gadgets or moving parts to get out of order. It's made from Lucite or Plexiglas by laying out the design on the masking paper and cutting the lines with a hacksaw. The holes are then drilled and the paper removed. Heat the plastic with a 250 watt lamp until it is soft and bend the strips for the hooks using a pair of cotton gloves. Do one strip at a time and use a rectangular piece of wood as a guide. The edges of the plastic can then be smoothed and the corners rounded with fine sandpaper. Wood screws are used to mount the holder. If you want to increase the capacity of the rack, make the square larger and cut more strips for the hooks.

TURNING DIAMETERS ON TABLE SAWS will pinch hit for the usual lathe setup. Set the fence for the length of the turning and the arbor so the right diameter will be cut. Then feed the work across the saw instead of into the blade's cutting plane.

ANOTHER SCOTCH TAPE KINK that'll save time and trouble is to mark the end of the roll by placing a small piece of paper under the top layer as shown. Then when you're in a hurry and grab the roll, the paper indicates the end of the elusive tape.



STRIPPING WIRES is a snap instead of a struggle if you sink the head of an old hammer in the top of your bench as shown. For small wires, cut the "V" in the claws deeper with a small file to give them a better grip.

A RUBBER HEEL PAD under pots or metal pads will anchor them firmly and also avoid the black marks they sometimes make on enamel surfaces. The pad can also be used to keep cans from slipping when they're being opened up. Be sure to use a non-marking rubber heel.

PHOTO CONTEST

MONTHLY PHOTO CONTEST RULES

Please put your name, address and picture-taking data on back of each print. Wrap with cardboard stiffeners and enclose a self-addressed stamped envelope for return of unused photos. Prize-winning pictures are not returned. Judges are MI Editors. Duplicate prizes awarded in case of tie. Photo Contest Editor, MECHANIX ILLUSTRATED, 67 West 44th Street, New York 18, N. Y.

1st Prize ($10.00)....Man In The Iron Mask Elmer E. Onstott of St. Louis dramatizes the welder with the aid of a Graflex. Exposure was 1/5th at f-5.6 on Super XX.

$5.00 Award.....Some Fun Taken by J. H. Ferrell of Detroit on a Speed Graphic. An interesting picture depicting cruel and unusual punishment.

$5.00 Award.....The New Easter Bonnet Two No. 2 floods enabled Leon Cantrell of Nashville, Tenn., to record the distress of wearing a new hat for the first time.

$5.00 Award .....Flight A Canadian contributor, Bill Cole of Owen Sound, Ontario, took this shot with a Zeiss Ikoflex II camera, 1/200th, f-11.

ironing board movie titler

Titles—the easiest way to achieve continuity in motion picture work.

THIS unique titling arrangement was designed by Vinton Hayworth, radio actor, in a successful effort to get the same titling tricks in his own movies that Hollywood studios get in theirs.

An ordinary ironing board was used for the base with the actual titler whittled out of an old orange crate. By turning the dowels at the top of the titler he can achieve *scroll* effects and *wipes*. A thumb nut in the center allows the operator to get *flip-flops*.

The camera, a Bolex, is mounted on two metal rods, squared up so that the center of the titler is in line with the camera lens. Note the receptacle at the side of the board which permits the two side lights to be plugged in without the bother of bringing it to a wall outlet.

Some rather unusual titling effects can be obtained with this setup. For instance, you can mystify your friends by showing a hand on the screen apparently wiping a slate clean. Yet, instead of the words disappearing, the hand appears to be "erasing on" a message. Here's how this tricky stunt is achieved:

Write your message with ordinary chalk on a child's slate. Set the camera running and start to wipe off the message by starting with the last word. *The camera must be upside down.* Continue wiping until the first word is erased. Now, when you get the film back from the processing lab cut out that part of the film which contains the title. Reverse it end for end and when it is projected you will get the startling effect described above.

By moving the camera in and out on the metal rods, you can get effects known as *zooms*. This is a variation of *in-and-out-of-focus*. Before you try this make sure the rods are marked so that you can stop the camera at the exact point where the title will be in focus.

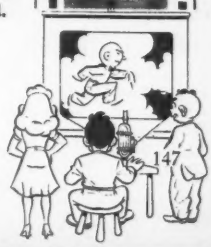
Of course, if you really are ambitious (and wealthy) you can load your camera with Kodachrome and shoot your titles with colored lights or colored cards thus getting some unusual effects.

You will find that with this setup you can superimpose titles on picture postcards thus identifying your titles more closely with the place where you spent your vacation. ●

Flip-flops, zooms and similar professional effects can be achieved.

Note the convenient electric outlet mounted at the side of board.

Photos by Larry Gordon



SURE FIRE FOCUSING

BY SAMUEL ENGLER

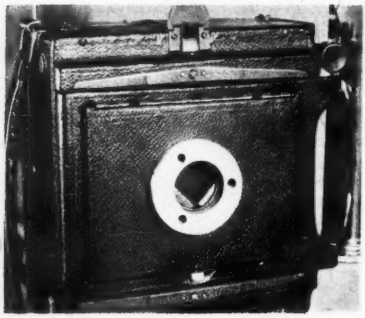
EVER have the range finder on your camera go on the blink during an important shooting assignment? If you have ever been in that uncomfortable predicament then you'll appreciate this device. It permits you to focus directly on the ground glass without having to open the cover.

The basic materials are a tripod magnifier and a metal ring. The ring should be wide enough to accept the legs of the tripod and yet kept within a reasonable size. Three holes should be drilled, deep enough and spaced to accept the legs of the magnifier and to hold them firmly in place. See drawing. The hole in the ground glass cover should be cut in the exact center and its diameter should coincide with that of the opening of the ring. The ring is attached to the cover from the inside with three small bolts. Take care that the screws do not interfere with the holes on the reverse side of the ring.

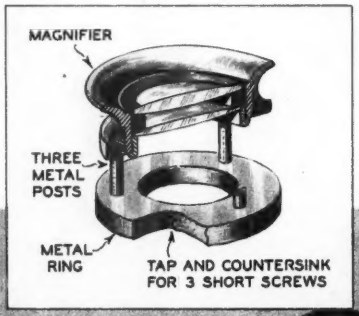
The magnifier, a ten power affair of the tripod type with a focusing arrangement, can be purchased at any optician's store for about 75c.

In use, the magnifier is inserted in the ring and applied against the eye for focusing through the ground glass. The idea is adaptable to all ground glass cameras such as the Speed Graphic, Linhoff, Recomar or Bee Bee.

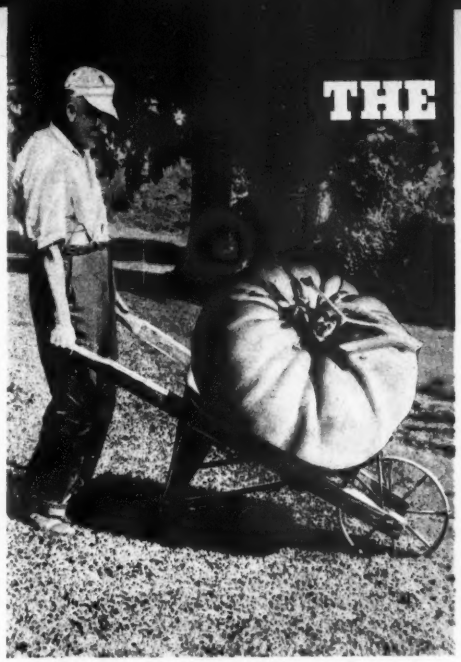
When using this device, make sure that the eye is always as close as possible to the magnifier.



Ring is ½ in. deep by ¾ in. wide. The inner opening is 2 in. in diameter. Attach the ring from underside with three bolts.



You can focus on ground glass without opening cover, eye can be quickly shifted to the finder.



THE BIG TOMATO •

WHILE Californians may brag about its everlasting sunshine, still and all, we'll bet that they never have been able to grow tomatoes to this size. This particular vegetable was not even grown in Florida. The Buckeye State, Ohio, produced this giant—photographically.

It all came about when a farmer complained to his photography-minded friend that he was disappointed in being unable to exhibit his crop at a fair because of the small size of his vegetables.

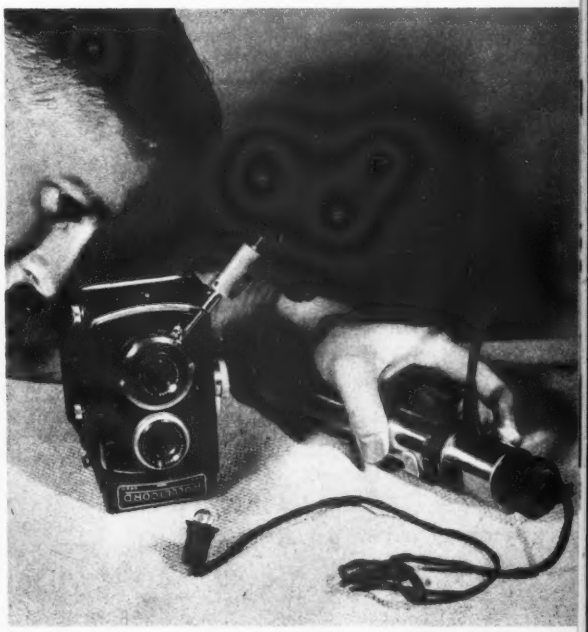
The friend promised him a picture of a tomato that would be the envy of the neighboring farmers and at the same time cause considerable amusement when the truth was disclosed. How did he make the picture? Turn the page.

Synchronizer Testing

THE synchronization of a flash gun may be checked with a fair degree of accuracy by using a flashlight bulb extension in the flash bulb holder as shown in the picture at the right.

A cord with a plug on one end and a flashlight bulb to match the batteries on the other end is used. When the plug is in place of the ordinary flash bulb, pressing the release button with a quick motion will trip the shutter and light the flashlight bulb for an instant. The flashlight should be a 3-volt lamp.

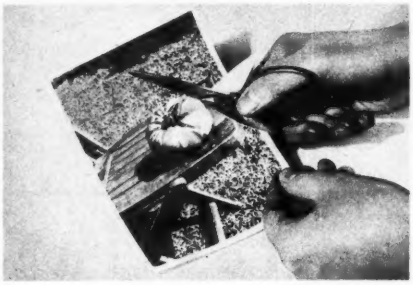
By looking through the back of the camera it can be noted if the light from the bulb may be seen. If not, the synchronization is definitely out of adjustment. This is a rough test of course, but if you can see the flash of the bulb with the shutter set at 1/100th of a second, you can be reasonably certain that your gun is in "synch" at 1/50th and 1/25th of a second.—*H. Leeper*



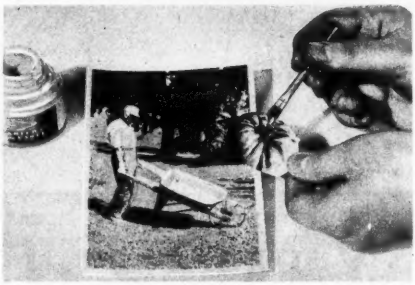
and how it was made

The first thing in making the Big Tomato was to take a picture of the farmer holding an empty wheelbarrow in a pose suggesting a rather heavy load.

The second step consisted of taking a good close-up of an ordinary tomato as large as possible on the negative using a portrait lens in front of camera.



Then an enlargement of the tomato was made and carefully cut out with a pair of scissors. Note that in both photos shadows fall in same direction.



Cut-out tomato was then pasted on the wheelbarrow. Final step consisted of copying the photo with the results shown on the preceding page.

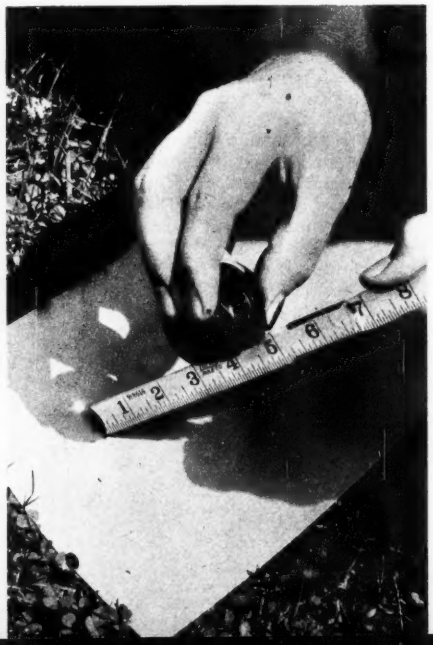
FOCAL LENGTH?

IT IS often necessary to know the focal length of an unmarked lens, for instance, when building an enlarger around a particular lens. A good approximation can be arrived at by using the method illustrated in the photograph at the right.

The rays of the sun are focused on a piece of gray cardboard moving the lens mount along a ruler as shown, until the sharpest possible image of the sun is focused on the cardboard.

The reading on the ruler at the center of the lens mount will give you a fairly accurate indication of the focal length of the lens.

In the illustration a 4-inch lens is being tested. Don't use a lamp bulb; this will yield wrong focal length. •

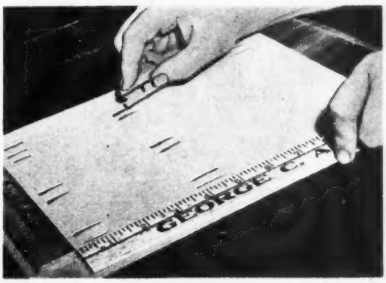


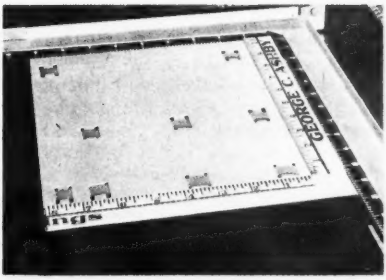
PRINTS WITHOUT MARGINS

Enlargements, a full 8x10 instead of the customary 7½x9½ inch prints made by most easels.

A reproduction of an 8x10 photograph. Every square inch of the paper was used.

A series of parallel slits are being cut into the cardboard base. These slits should be just a little longer than the width of the scotch tape.





How the completed "easel" will look with all of the slits loaded with the scotch tape. A pair of slits should be in each corner.

PHOTOGRAPHIC enlargements without the customary white borders can be turned out easily and rapidly with this easel. You can make it in a few minutes with a yardstick, a piece of cardboard, a razor blade and some pieces of scotch tape.

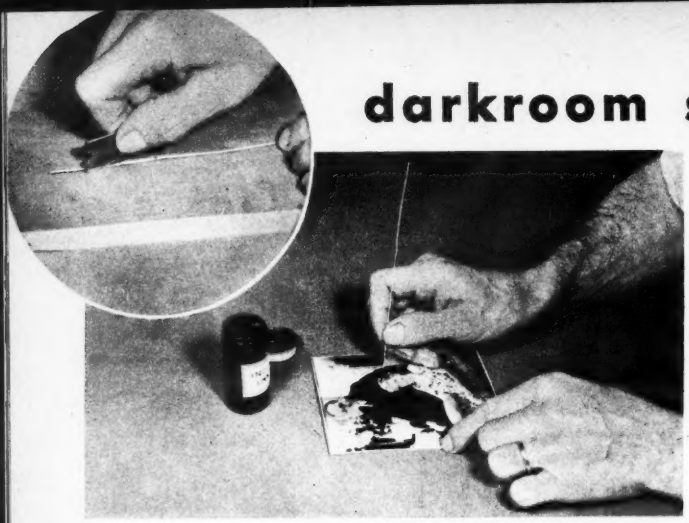
Cut two sections, of the lengths shown, from opposite ends of the yardstick (so as to get the numbers running in opposite directions). Fasten them to a piece of cardboard, cut to about 12x14 in. Do not use glue, as it will cause the cardboard to warp. Use a stapling machine, driving the staples from the back.

With the razor blade, cut some parallel slits as shown in the photo. Insert the ends of individual pieces of scotch tape in the slots, leaving the sticky side up and pressing the ends firmly against the bottom of the cardboard.

To use, butt the sensitized paper against the inside edges of the rules and press firmly against the sticky surfaces of the tape. After the exposure has been made, the paper can be released easily by picking it up at the corners.—*George S. Cowlam.*

Slight tug at corner will enable you to get sensitized paper off the easel without any damage. Tape can be replaced when it dries.

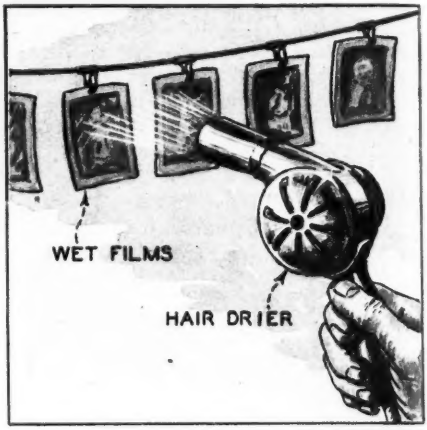
darkroom shortcuts



A SPOTTING BRUSH for retouching photographs can be made from a straw pulled out of a broom.

Cut the straw with a razor blade at a sharp angle as shown in the inset. Then dip the straw in India ink or your favorite spotting medium and apply it to the area you want to spot out.

FILTERING is always a slow job because the filter paper sticks to the funnel. If you place three stirring rods between the paper and the funnel, the paper will not stick and thus allow the fluid to seep through the paper much more readily.



A HAIR DRIER is a useful piece of apparatus in the darkroom. Its gentle stream of warm air when not drying out your wife's locks can be drying out the negatives you took of her. Drying time can be cut to about five minutes.

THE QUESTION BOX

By Robert Brightman

Photo fans! Use this column for answers to any of your problems on photography. If the question involves a print fault please include the print with your letter (and postage for its return.)

Is the diagram correct for the Hi-Speed flash lamp which appeared in the December 1946 issue of MI? David Kling, Greenwich, Conn.

The diagram should show one resistor and condenser from either side of the line.

Can you tell me how I can take stamp-size photographs? Habib Brother, Tvool, South Africa.

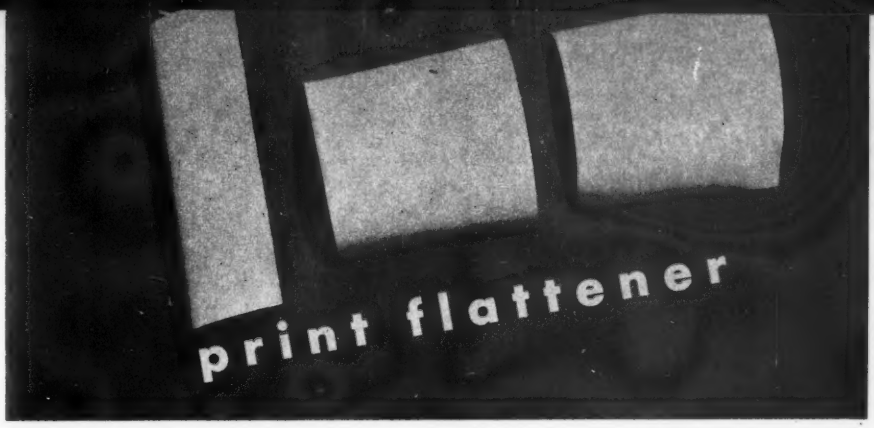
Under separate cover we have sent you detailed information telling you how this can be done.

What do the words "Portrat," "Gruppe" and "Landschaft" mean on my Voigtlander camera? Ray B. Ash, Hooker, Okla.

The three words in German mean "portraits," "groups" and "landscapes."

What causes a series of circular cracks on the surface of my glossy prints? Merl Jenkins, Maryville, Tenn.

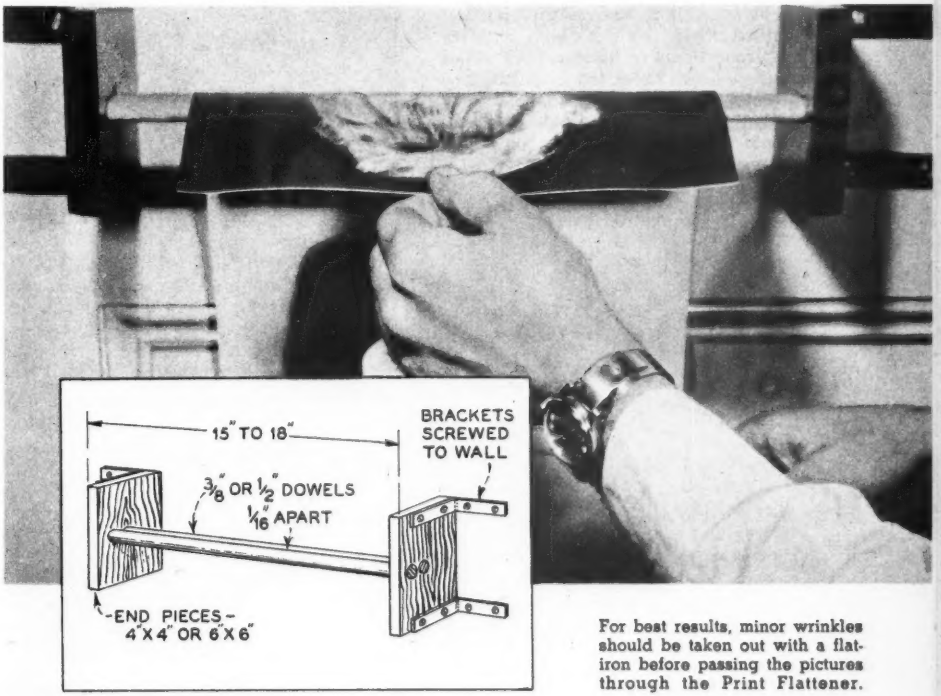
These defects, known as "oyster shells," are usually caused by too rapid drying.



WHEN most prints have been dried in the customary manner, they usually look like the sorry specimens at the top of this page. If they look at all familiar to you, then you ought to get busy making this Print Flattener.

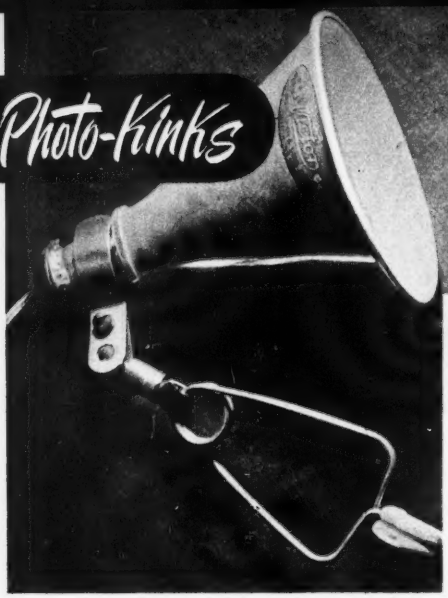
Get some scrap lumber, 2 dowels and 4 angle brackets. Assemble these parts as shown in the sketch below. Before the dowels are glued in place they should be sanded down to a smooth finish with fine sandpaper, given several coats of wax and rubbed to a high luster. *Don't use paint or shellac.*

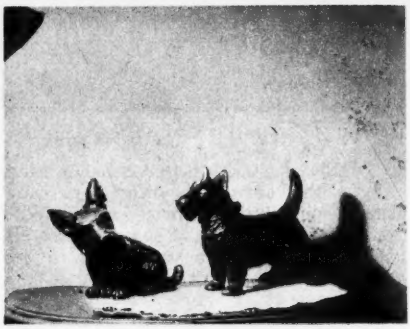
To use the Print Flattener, first push one end of the print, face up, through the slot on the bottom and then slowly and carefully pull the print through, bending it toward the front as much as possible. If necessary, repeat using another end. This process will straighten the most recalcitrant print. •

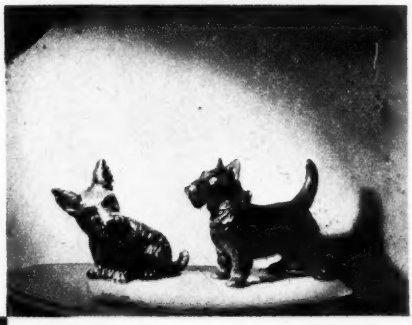


For best results, minor wrinkles should be taken out with a flat-iron before passing the pictures through the Print Flattener.

Photo-Kinks



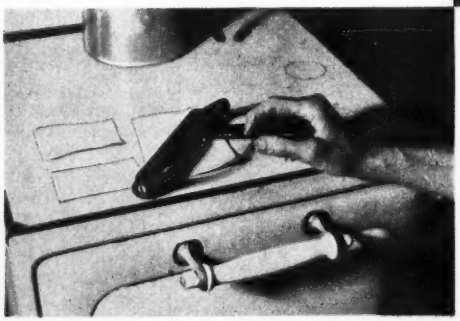




COMBINATION REFLECTOR. The small spot reflector shown at the top of the page can double as a flood-type reflector by first inserting an extension socket before installing the photoflood bulb.

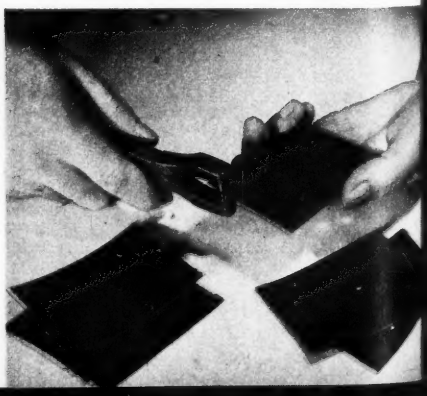
Photo at top, right, shows the lighting effect gained when the extension is used. Note the broad beam of light as contrasted to the narrow beam procured when the extension is not used, lower photo.

Extension sockets are available at hardware or electrical supply stores for about 15 cents apiece.



FERROTYPING HANDY. The oven top of the kitchen range can be used for emergency ferrotyping. Wax the top lightly in the area to be used and then roll the prints down in the regular manner. A slightly warm oven will quickly put a satisfactory glaze on the pictures.

NEGATIVE IDENTIFICATION When filing negatives into different classifications, notch the edges to indicate under which class they belong. Negatives can then be returned to the correct section without necessity of studying the image.



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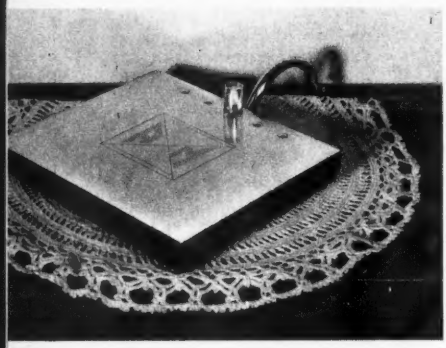
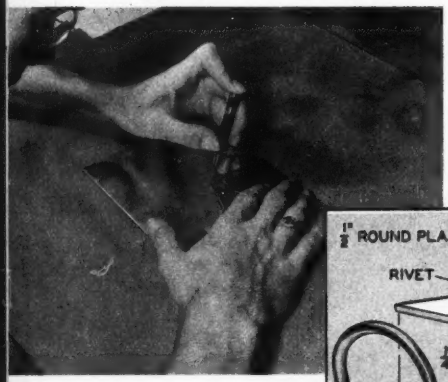
NEW KODAK COMBINATION FILTER CASE carries Adapter Ring, a Lens Hood, and four filters.

Silent Butler

The master of the house puts "Jeeves" to work. Handle should be bent so cover doesn't hit knob.



Above: Stylized design of letters adds a distinctive touch to the gleaming aluminum.

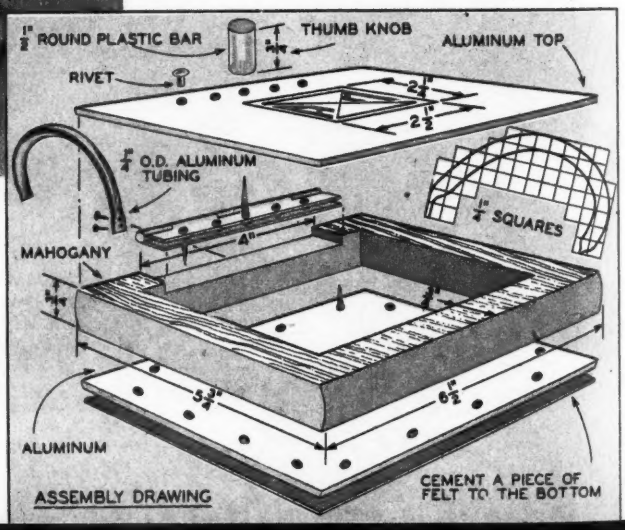


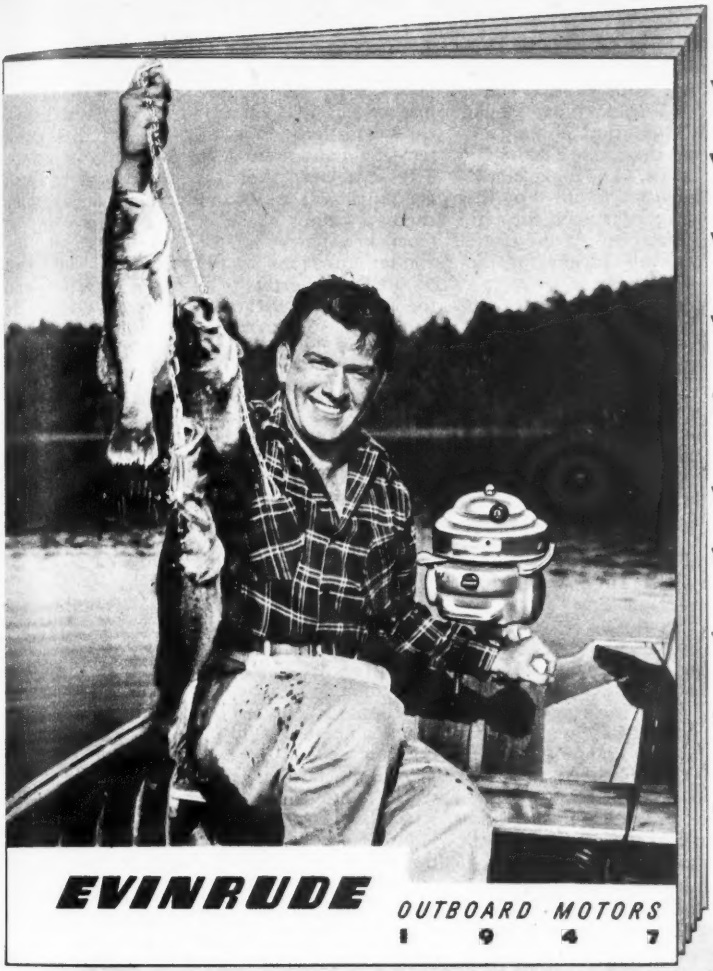
Top: Using automatic center punch to form outline of letters on top. Satin finish hides tool marks.

Handle is flattened at ends and screw fastened.

ONE of the more accomplished social graces is the art of being a charming host or hostess while scurrying between the living room and kitchen emptying the mountain-high heaps of cigarette butts from the ash trays. If you find this a difficult chore (and who doesn't) then take an evening off and make yourself this handsome silent butler.

The drawing will give you all the details and dimensions of "Jeeves." Start him off in life by making the mahogany frame and fastening the aluminum bottom to it with flat-head screws. Then bevel the bottom, filing both wood and metal. The next number on the program is the top and here you can use your artistic ability. Use a grease pencil to form the letters and then prick punch the outlines and bodies. Hinge the top to the body as shown and give it a satin finish with fine emery, steel wool and oil. The handle is then made, and bent to shape using the pattern. After getting a satin finish, the aluminum tubing should be fastened to the frame with wood screws. The thumb knob is the last part to go in place. Following this, use a filler on the mahogany and give it several coats of varnish.—*R. J. De Cristoford.*





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Building Victory One-Design

[*Continued from page* 130]

for the mast and the step, which should be curved to fit the keel. With these in place, notch the frames for the chain plate blocks and screw these pieces in position. Moving aft, notch the frame ends for the cockpit stringers and fasten these in place. The oak blocks which fit between Frames 4, 5 and 6 at the sheer should be shaped and fastened through the sheer stringers and frames. At the stern, make and fit the supporting blocks for the boomkin outriggers.

The next operation is the planking and while you can do this with the boat in its present position (rightside up), the job's a lot easier with the hull turned upside down (the way you started off). So roll her over carefully and get on with the planking. The plywood sheets can be wrapped around the planking without any difficulty if you'll keep a few points in mind. First, make paper patterns for the particular area you're planking so you don't waste material. Second, begin on the bottom up near the stem and work aft, allowing a small margin on each side for the final shaping after the piece is in place. Third, don't forget that the "straight line" along the keel is actually curved when you lay the plywood down flat on the floor. When all the sheets are cut to shape, coat all the framing with marine glue and start fastening the plywood in place, using ¾ in. screws on 3 in. centers, and working from the stem aft. Butts in the planking should be made between frames (not on them) and backed up with ¼ in. plywood blocks, fastened with ⅜ in. screws from the inside. Don't try to countersink the fastenings but fill the slots with yacht trowel cement. All seams should be filled with a good marine filler.

With the bottom and sides fully planked, and trimmed at the keel, chine and sheer, roll the boat rightside up again. Before getting on with the decking, give the inside of the hull a coat of wood preservative such as Cuprinol and follow it with one or more coats of paint. The plywood decks should then be cut to shape and fastened in place using the same method as for the planking. Be sure that the decking bears flat against all blocks, beams, etc. before you fasten it down. Cut slots for the chain plates and screw the ends to the chine stringer on each side. The next step is to lay the deck canvas in one of the glues made for this purpose. The cloth should be carried over the sheer and cockpit opening and secured with copper tacks. After it's in place, give it a coat of dope, followed by one or two *thin* coats of paint. When it's dry, add the cockpit coaming and half-round sheer molding. The rudder, tiller and boomkin parts can now be made and varnished.

Before fastening the deck fittings down, give the bottom and side planking a coat of primer followed by anti-fouling paint below the waterline. The sides above this point may be painted whatever color you select. The transom, sheer molding and cockpit coamings will be more attractive if you give them a bright finish with several coats of varnish. When the last one is dry, bolt the rudder gudgeons to the transom. The rest of the deck hardware is plainly labeled and the locations indicated on the drawings. Be sure and use bearing blocks under the deck below the jam and halliard cleats before you bolt them down.

The sails for the boat should be made by a reliable sailmaker. Let him decide on the weight of canvas to use (preferably the lightest). While he's working on them, get started on the mast and boom shown in Figure 9. By using modern marine glue and plenty of clamps, there's no necessity for using fastenings on the hollow mast. The top is made of two pieces of ¼" plywood with spruce fillers below the sheave. When both spars are finished, sand them down smoothly and varnish well. Then after the spreaders are made, add the fittings and rig the stays, following Figure 9. The stainless steel rigging wire should then be cut to the lengths indicated and all rigging both standing and running, completed *before the mast is stepped in the boat.*

You can now hang the centerboard in the trunk and bolt on the hoisting strap. Then when that happy day arrives and your boat is finally launched, all that remains is to step the mast and bend the sails to the tracks. And may your Victory live up to her name in every race you enter.

BILL OF MATERIALS
(Approximate Quantitjes Required)

Waterproof Marine Plywood

Frames (All-Plywood)	5 Pcs. ¾" x 4' x 8'
Frames (Alt. Constr.)	2 Pcs. ¾" x 4' x 8'
Bottom, Sides and Deck	10 Pcs. ¼" x 4' x 8'
Transom (may be mahog.), Extra Deck Beams, Stem and Rudder	¾" Plywood Scrap
All Gussets, Boomkin Piece, Masthead Pcs., etc. C. B. Trunk Sides	¼" Plywood Scrap

Seasoned White Oak

Transom & Quarter Knees, Breast-Hooks, Misc. Blocks	12 Lineal Ft. 1" x 9"
Mast Step	1 Pc. 3" x 4" x 10"
Tiller	1 Pc. 1¼" x 2½" x 5' 6"
Boomkin	2 Pcs. ⅞" x 2" x 3'

Spruce or Straight-Grained Fir

Chine Stringers	2 Pcs. ¾" x 1¼" x 17' 6"
Sheer Stringers	2 Pcs. ¾" x 1¼" x 20'
Cockpit Stringers	2 Pcs. ¾" x 1¼" x 8'
Frames (Alt. Constr.)	50 Lineal Ft. ¾" x 2" 27 Lineal Ft. ¾" x 3"

[*Continued on page* 160]

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"Sharkie"

[*Continued from page* 140]

in the hardwood block located in the lower fuselage section.

The fin is cut from 1/8 in. plywood and carefully cemented in the groove which is now cut into the upper shell of the fuselage.

The stabilizer outline is now traced on 1/8 in. plywood and after the outline is cut, the elevators are severed, as indicated. Hinge the elevators to the stabilizer in the manner shown or else use your method of hinging.

The belly skid is now shaped from 1/16 by 1/2 in. wide aluminum and bolted to the underside of the fuselage. Insert small screw eyes into the left wing panel to act as a line spreader and then sand the fuselage smooth.

Consulting the drawing, the dolly is next made from 1/8 in. piano wire and ordinary coat hanger wire. Solder the joints as indicated and fit the two upper sections to the fuselage. Bind these areas with tape, as shown.

Test flying is a routine job. Wind up the motor and hand launch rather than attempt a dolly take-off at first. If the center of gravity rests as shown on the plan and the elevator incidence settings are 0 degrees, you should have as much trouble as we did on the 128 mph maiden flight! •

Soap Box Derby Winner

[*Continued from page* 115]

out exists in the base for the drag brake, which is merely a piece of oak hinged at the forward end. The rear section is covered with inner tubing or the worn tread of an old tire. Inner tubing strips are tacked to the top of the skid and anchored directly beneath the seat to hold the brake flush with the base when not in use. The brake pedal is a piece of iron hinged to the center core.

Nail and glue the center core to the base and then proceed to rough trace the body layer outlines on 1 in. stock. The shaded portions of both side and top view will serve to show you how much each layer is cut away. The body should be shaped so you can just barely get into position, which in turn may require altering the shape slightly. After each layer is rough cut, allowing about 1-2 inches for final trimming, carefully glue the pieces in place.

To cut down wind resistance, the celluloid windshield, cut from a 18x30 in. piece, is V-shaped and the rear trimmed to fit the driver •

ENLARGED SOAP BOX DERBY RACER PLANS

showing body layers and core section one-quarter actual size will save you hours of work. Send fifty cents to MI Reader Plan Service, Greenwich, Conn. Order plan HJ-11.

Building Victory One-Design

[*Continued from page* 158]

Side Frames (For above)	From 3/4" x 2" Spruce Scrap
Mast—Sitka Spruce or Oregon Pine	52 Lineal Ft. 1/2" x 4 1/2" 26 Lineal Ft. 3/8" x 4" 26 Lineal Ft. 3/4" x 4"
Boom—(Same material)	1 Pc. 1" x 4 1/2" x 9' 7"
Spreaders	10 Lineal Ft. 7/8" x 3"
Transom Cheek Pieces	6 Lineal Ft. 1/2" x 2"
Flooring	4 Pcs. 3/8" x 4 1/2" x 8'

Mahogany

Keel (may be spruce)	1 Pc. 1 1/2" x 6" x 15'
Transom (may be plyw'd)	10 Lineal Ft. 3/4" x 6"
Cockpit Coamings	40 Lineal Ft. 1/4" x 2" 4 Pcs. 1/4" x 6" x 6"
Sheer Molding	2 Pcs. 3/4" Half Round x 20'
Centerboard Bed Logs	2 Pcs. 1 1/4" x 5" x 4' 3"
Pine Centerboard Posts	Made from 5/8" stock—sawn to shape

Hardware

Note: The Fig. Numbers for all fittings shown on the plans refer to the catalog of the Wilcox-Crittenden Co., at Middletown, Conn. However, similar fittings of other marine hardware manufacturers may be substituted.

Sail Track, 5/8" Standard	29 1/2 Lineal Ft.
Tangs	15 Lineal Ft. 3/4" x 16 ga. Brass
Sail Stop, 1 3/4" (Not Shown)	(Fig. 8241)—1 Required
Angles For Spreaders	1 Pc. 1/16" x 3/4" x 3/4" x 15" Brass
Boomkin Eye Bolt & Nut (Figs. 220 & 679)	Bolt cut off and rethreaded to fit
Angles—Frames to Trunk	1 Pc. 1/4" x 1 1/4" x 1 1/4" x 40" Brass

Fastenings

Note: All F. H. Brass or Everdur unless otherwise noted.

Spreader Bolts	10 Req. 1/4" x 1"
Spreader & C. B. Angle Screws	2 Doz. 1 1/4" No. 9
Bolts for C. B. Angles	2 Doz. 1/4" x 1 1/2"
Boomkin Bolts	10 Req. 1/4" x 2 1/2", Galv.
Planking, Decks, Gussets	11 Gross, 3/4" No. 6
Flooring to Frames	3 Doz. 1 1/4" No. 9
C. B. Trunk Sides	7 Doz. 3/4" No. 6 or 1/8" Rivets & Burrs
Butts	1 gross 3/8" No. 6
Quarter Knees, Blocks	5 Doz. 1 3/4" No. 10
Cockpit Coamings	8 Doz. 1/2" No. 6
Stringers	5 Doz. 1 1/2" No. 10
Transom Cheek Pieces	3 Doz. 1" No. 8
Stem and Transom Knee to Keel	1/2 Doz. 1/4" x 3" Galv. Bolts
Floor Timbers & Mast Step to Keel	1 1/2 Doz. 1/4" x 5" Galv. Bolts
C. B. Bed Logs to Keel	1 1/2 Doz. 1/4" x 6" Galv. Bolts

Miscellaneous—Deck Canvas—85 Sq. Ft. 12 oz.; Paint, Varnish, Primer; Cement and Seam Filler, Tacks, Marine Glue, etc.

•

VICTORY CLASS ASSOCIATION

If enough builders are seriously interested in Victory One-Design Racing, an association similar to those for the Snipe and Lightning Classes can be formed and a set of rules for measuring and racing adopted. In this way, owners in the same vicinity may be brought together, official racing numbers assigned, and local Victory fleets formed. As they grow, regular inter-fleet racing can be organized and in time National Championship Regattas held. To get this association started, when you have the keel, stem and frames of your boat set up, send your name and address to:

Mr. William F. Crosby
c/o Victory Class Association
67 West 44th Street
New York 18, N. Y.

VICTORY BLUEPRINTS

LARGE-SCALE prints make it easier and quicker to build this boat. Order plan No. B-145 at $3.00 the set, from the MI Reader Plan Service, Greenwich, Conn.

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"Dead-Locker"

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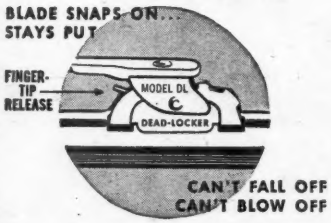

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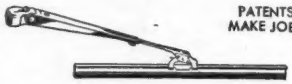
DON'T SHOOT YOUR GAS-PUMP MAN!

He's doing the best he can. Sure, he knows how dangerous it is for you to drive your car . . . in stormy weather . . . with your dull old windshield wipers that smear and smear. He'd gladly put on for you quickly a pair of keen new ANCO RAIN-MASTER Wiper Blades and Arms. He has them—Newest Models! But he forgets to remind you? Too busy? You can't shoot him for that!



After all, it's *your* car to protect. So *you* remind *him*. Get RAIN-MASTERS . . . patented features . . . original equipment on many makes of high grade cars and trucks . . . used in war—on our fighting tanks and trucks and ships and bombers too...because ANCO RAIN-MASTERS clean quicker, clean cleaner . . . last longer. May save you a costly smashup.

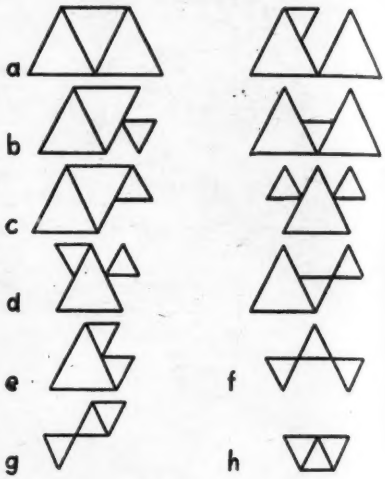
Ask for RAIN-MASTER Windshield Wiper Arms and Blades next time you buy gas.

THE ANDERSON COMPANY
Established 1918
GARY, INDIANA

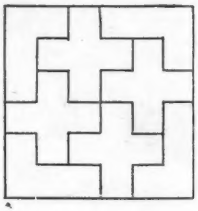
Answers, MI Brain Busters

(*See page* 96)

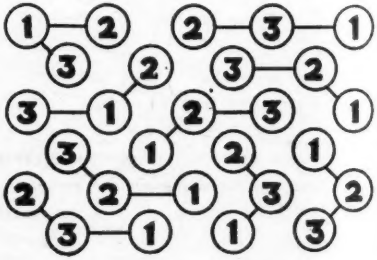
10. Solutions (in some cases there are equivalent arrangements):



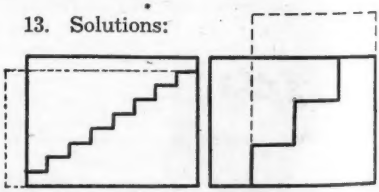
11. Solution:



12. A solution:



13. Solutions:



14. Answer: 48.

What's your choice of these *Marlin* .22's?

Be sure to see these three fine Marlin '47 models at your dealer's soon! Each is an outstanding rifle in its class.

Often called the "world's best all around .22," Marlin's 39-A is a light rifle of remarkable accuracy and versatility. Only lever action .22 made. Extra fast for snap and exhibition shooting.

● Here you have three great rifles for small game and all around sport. Marlin's 39-A is the only lever action .22 repeater made...a favorite in hunting circles the world over since 1892. As a practical weapon for vermin and small game, the 81-DL is a wise selection. It carries a full day's ammunition, and its light weight is a great asset in the field. The loaded clip of the 80-DL provides extra shots for fast-running game...and allows use as a single loader for target work. All three are rugged, man-sized Marlins, famous for accuracy and dependability. All shoot .22 short, long and long rifle cartridges—regular or high speed—without adjustment. Whichever you choose, you'll buy years and years of trouble-free sport!

A full day's hunting is provided by the large 25-shot capacity of the Marlin 81-DL. Removable bolt assembly; Off and On safety... a fine "learning gun."

With eight shots to the clip, Marlin's 80-DL gives you a rapid fire load for fast-running small game and vermin. Also handy as a single loader on the firing line.

Marlin .22 Rifles

Outstanding for accuracy, dependability, long life

THE MARLIN FIREARMS CO., NEW HAVEN, CONN. • *Fine Guns Since 1870*

Smooth, steady power at your fingertips! Perform precision operations not possible with any other portable tool! With a Handee you can turn out professional-looking projects for pleasure or profit—ship, plane and train models, costume jewelry, wood carvings, puppets, initialed tumblers, etc. AC or DC. 25,000 r.p.m. Wt., 12 oz.

USE THE RIGHT ACCESSORIES—Choose them from the most complete line—more than 500 made right in the Handee plant.

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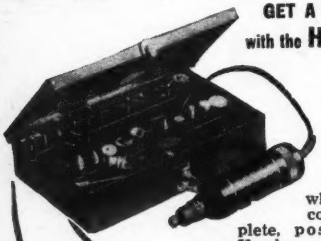

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☐ Remittance enclosed ☐ Send C.O.D. ☐ Send 52-page Manual

Name .....

Address .....

.....

Man of the Monsters

[*Continued from page* 52]

and then milked out again into the pail.

"That cow sure fooled a lot of people," chuckles Messmore. "Once a hard-bitten old farmer watched her for some time, then came over and remarked, 'You know, I've been watching thet cow fer over an hour now, and by gosh she's still givin' milk!' "

Today Messmore's extraordinary inventory calls for a large staff of skilled wood carvers, seamstresses, machinists, scenic artists, sculptors and workers in every medium from welding to stage carpentry. Messmore himself does most of the sculpture work and can figure out in a jiffy what complicated eccentrics, gears, rods and cams are needed to bring anything from a six-inch dwarf to a 60-foot brontosaurus to life. He once made a herd of elephants which walked across the Zeigfeld stage carrying chorus girls in their trunks.

When a department store books one of his exhibits it pays a flat sum, sometimes as much as $15,000 plus half the gate up to $35,000. Frequently Messmore will revive an old show, such as "The World a Million Years Ago" or "The Torture Chamber," and send it on tour.

"Those shows will never become outdated," he claims. "Heck, one's a million years old already and it still packs 'em in!" •

Ever Try Spinning?

[*Continued from page* 78]

speaking, the commonly used spinning baits run from this weight up to a half ounce, which takes in quite a few of the most popular artificial lures used by casting rod addicts, and many they cannot handle at all.

The live bait fisherman, for trout, bass, panfish, or 'most any of the finny tribe, also will find the spinning outfit ideal. A good-sized worm is heavy enough without any added weight. So is a small minnow, a crawdad, or a shrimp. The smooth, easy cast possible with the light rod and spinning reel permits the throwing of these live baits without killing them or tearing them off the hook by rough casting. A special gang designed for minnows permits adjustment for any speed of spin desired by the angler.

Judging by reports from sporting goods dealers, spinning equipment is in great demand this season. Whatever the reason for the increased interest may be, the chances are you will see fishermen out with these odd-looking outfits wherever you go this spring and summer. Sooner or later you'll have to try one out—from curiosity, if for no other reason. Spinning must have real advantages to account for its popularity in other countries. •

King Kut

The Royalty of

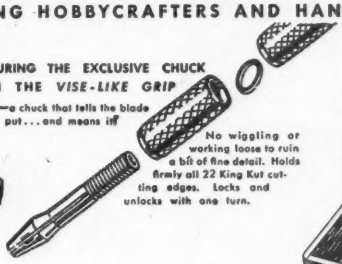
KNIVES, TOOLS AND BLADES

FOR DISCRIMINATING HOBBYCRAFTERS AND HANDICRAFTERS

Hobby Tool Set
No. 120...Price $5.00

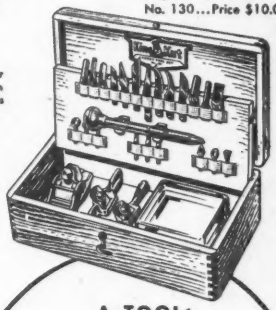
FEATURING THE EXCLUSIVE CHUCK WITH THE *VISE-LIKE GRIP*

At last—a chuck that tells the blade to stay put...and means it!



No wiggling or working loose to ruin a bit of fine detail. Holds firmly all 22 King Kut cutting edges. Locks and unlocks with one turn.

Regal Treasure Chest
No. 130...Price $10.00



THE QUALITY LINE THAT'S GAINING POPULARITY FROM COAST TO COAST

The word is getting around—there's nothing like King Kut! Wherever hobbycrafters and handicrafters get together, they're talking ... and buying ... King Kut. Ten-year youngsters sweating out their first simple glider . . . wing-wise tournament vets building power models of their own intricate design . . . artists working in leather, wood, linoleum . . . model railroaders at work on stations and landscapes . . . camera hobbyists cutting mats for their proudest pictures...perfectionists working in the unbelievable detail of model shipbuilding. Whether they started with only one King Kut knife or use the superb King Kut Regal Treasure Chest that holds the complete assortment—all are agreed: When you're talking quality, design and performance—*there's nothing like King Kut!*

For fine delicate work, King Kut Saw No. 51 fits into the balanced handle...15c each.

King Kut's superbly tooled, polished aluminum handle, colored plastic knob and one each of blades No. 1, 2, 3, 4, 6 and 6. Handle has VISE-LIKE GRIP. Knob is removable. Price...handle—$1.00; knob—25c; blades—10c each.

KING KUT SETS range in price...$1.00 to $10.00

King Kut Products are covered by Fair Trade Agreements.

A TOOL FOR EVERY NEED

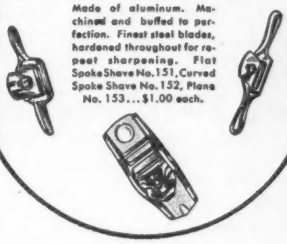
CARVERS... For speedy, safe and precise hollowing-out...take carving out of the GOUGE AND GUESS class. Left to right: Carvers No. 21, 22, 23, 24, 25 and 26...20c each.

ROUTERS... For shaving or carving those hard-to-get-at spots...U-shaped, V-shaped, dove-tailed and rounded. Left to right: Routers No. 31, 32, 33, 34, 35 and 36...20c each.

PUNCHES... For punching holes in soft wood, paper, leather, cloth. Left to right: Punches No. 41, 42 and 43...25c each.

SPOKE SHAVES AND PLANES

Made of aluminum. Machined and buffed to perfection. Finest steel blades, hardened throughout for repeat sharpening. Flat Spoke Shave No. 151, Curved Spoke Shave No. 152, Plane No. 153...$1.00 each.



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ANNOUNCING SYNCRO . . . new, remarkable, patented magnetic jig saw! Needs no belts, no motor, no gears, no oiling! Just plug into any 60 cycle A. C. 110-130 volt outlet—and saw! Portable. Use anywhere, kitchen, basement, attic, etc. Cuts clean, smooth . . . no sanding necessary! Perfect for models, displays, inlays, silhouettes, etc. Ideal for hobbyists, craftsmen, light production. Cuts intricate designs on ¾" soft wood, ½" plywood and thinner hardwoods, metals, plastics. Leaves NO ragged undersides on plywood or heavy cardboard. Cuts to center of 27" circle. This rugged, powerful power tool is NOT for ordinary lumber cutting but is unsurpassed for intricate and fancy scroll work, etc. Special magnetic safety stroke feature permits even small children to use. Nothing else like it! Sold on 10 Days Moneyback Trial. Prompt delivery guaranteed—*if you hurry!*

HURRY! SEND COUPON! CIRCULAR FREE!

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SAFE AS A HAND SAW JUST GUIDE IT!

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U.S. Patent 2233862
Other Patents Pending

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It's fast . . . cuts on an average of 1 ft. per minute up to ¾" medium hard wood. Operates on 110-120 V. 50 or 60 cycle alternating current. If your dealer does not yet have Moto-Saw, send $5.85 . . . we'll pay postage. Or send $1, pay postman balance plus postage. MONEY BACK if not delighted after 5 days trial.

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EASY TO ASSEMBLE
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New Plastic Discovery

MAKES LEATHER and LEATHERETTE ITEMS — LIKE NEW!

Save Cost of Re-Covering With New Leather

Make Cloth Into A Leather-Like Material

Use This Plastic To Cover Leather, Leatherette or Cloth. Make It Look Like New Leather.

A new plastic discovery has recently been put on the market which is called Leather-New. This amazing plastic coats Leather, Leatherette and Cloths and gives them a new leather-like finish in just five seconds. Quickly and easily spread over any material with a brush or spray gun it dries completely in fifteen minutes. One quart of Leather-New covers approximately 60 square feet. Even inexperienced hands can spread it on smoothly as it leaves no brush marks. Costs only a fraction of the cost of new leather goods. With this amazing discovery old leather and leatherette covered items can be made to look like new. Cloth covered Gliders, Deck Chairs, Porch Swings, Tarpaulins and many other items can be given a water and weatherproof, leather-like coating—making them much more valuable than they were with ordinary cloth coverings.

Auto Seat Covers
Golf Bags - Shoes
Any Leather or Leatherette Item

FREE SAMPLE
Of Leather - New Coated Material

SAVE MONEY

COATS LEATHER and LEATHERETTE WITH NEW FINISH and COLOR

Does Not Crack, Peel Or Scuff

DRIES IN FIFTEEN MINUTES

The color of leather and leatherette items can be quickly changed by coating them with this new plastic discovery. Leather-New does not crack, peel or scuff in coldest weather. Does not get sticky in hottest weather. Get a FREE sample of Leather-New covered material—see for yourself just what this amazing plastic does—simply fill out coupon and mail it on a 1c postcard today.

Alcohol, Acid Or Caustics Do Not Harm This Finish

NOT A PAINT OR VARNISH—BUT PLASTIC

A Leather-New coated job is easily cleaned and will stand repeated washings with strongest soaps—soot, dust or dirt wash away like magic with a damp cloth. Acids, Alcohol or Caustics do not stain its finish. It will remain clean and new looking as long as real leather. Leather-New will save many dollars on leather goods that otherwise would have to be thrown away. Act quick—mail 1c postcard today for FREE sample of Leather-New coated material.

JUST SPREAD IT ON WITH A PAINT BRUSH —LEAVES NO BRUSH MARKS

Get Into This MONEY-MAKING Business

I'll Show You How To "Cash In" On Big Jobs Such As Coating The Leather Furniture Of Bars—Grills—Restaurants

MAKE FROM $50.00 TO $500.00 ON A SINGLE JOB

This business offers tremendous profits to men who can see its possibilities. Let me give you an exclusive territory in which to handle Leather-New Sales and Service— Let me help you build your own profitable business in your exclusive territory. You do not risk one penny—simply send me your name and address on a 1c postcard—I'll do the rest.

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Mr. Edwards, rush me FREE sample and complete details about Leather-New. I understand this does not obligate me in any way.

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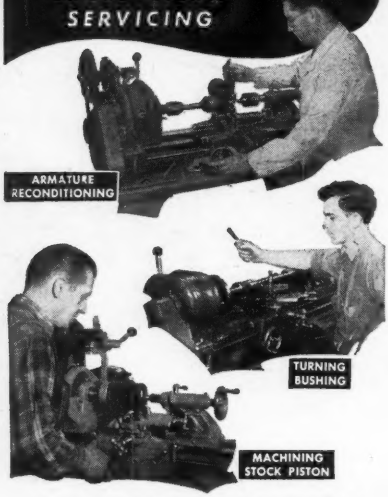

Garages all over the nation are rapidly equipping with Atlas lathes. It's a profit hint to consider if you operate or work in such a shop — a valuable use to remember for your home shop Atlas. Three typical servicing jobs are shown above — 3 of 44 different jobs you can handle on an Atlas lathe with accessories. Send for latest catalog and facts about automotive servicing.

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TABLE SEGMENT—Shows degree of table tilt—graduated. **SPLITTER**—Hard temper cold rolled steel. **GUARD**—Aluminum. **MITER GAUGE**—Aluminum. Accurately graduated 45° each side of center. **BEARINGS**—(2) Oillite bronze. **CAPACITY**—0 to 2¼". **TABLE**—12" x 14".

SHIPPING WEIGHT—44 lbs.

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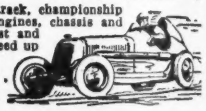

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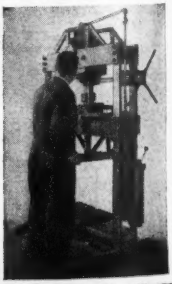
Write for your copy today.



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Use it for grinding, routing, drilling, sawing, polishing, carving, sanding and 9,994 other uses. Increases your skill and your scope. Precision-engineered, AC-DC. More exclusive features than any other tool.

Exclusive Safety Fingergrip for fine detail work

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COMPLETE WITH 36 ACCESSORIES IN FITTED STEEL CASE

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Works Wood, Metal, Glass, Plastics

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Ottawa Self-Propelled Buzz Master

CLEARS LAND FAST! Powerful 6-HP motor with friction clutch for safe operation. Cuts down timber, brush and hedge; turn blade vertically and saw logs to length. Can be equipped to fell largest trees. Has clutch pulley for belt work. Is fully guaranteed.

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Mows and Trims Lawns

In One Simple Easy Operation

8¼ Lbs.

Save Time and Labor with a

MONTAMOWER

New model. New type metal handle has special device to adjust cutting height. Drive shaft now mounted on free rolling, factory lubricated, and sealed ball bearings. No tired backs or aching arms. 8¼ lbs. of live precision made mechanism that first gathers, then cuts smoothly a clean 16" swath through grass, dandelions, spike grass and weeds. No noise or clatter. As modern and efficient as your electric razor. Cuts right up to walls, fences, trees or posts; leaves no fringes to be trimmed by hand. Cutters are self-sharpening. Built to last many years. Many thousands in use. Sold direct from factory. Costs little. Write at once for guarantee information and literature.

MONTAMOWER DISTRIBUTING CO.
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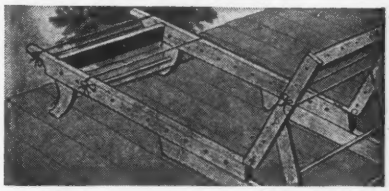
WORKSHOP WISDOM

Gluing rickety porch chairs



Porch and garden sets need an *outdoor* glue for lasting repair, a glue which will withstand repeated soaking and drying.

CASCOPHEN is the outdoor glue that makes rickety porch and garden sets snap back "solid as new." *Binds* and *weatherproofs simultaneously.*

To repair all wooden furniture:

Take loose chair or table apart.

Clean out old glue, then re-glue, coating both parts of a joint.

Bind with heavy cord. Let set according to directions on package.

Important—for outdoor furniture use CASCOPHEN—protects joints from weather, moisture, etc.

—for indoor furniture use CASCO—the standard household repair glue.

For veneering and stain-free gluing of fine cabinet work use CASCAMITE.

Highly water-and moisture-resistant. Forms bond strong as wood itself. Has many repair and model-building uses.

Get CASCOPHEN, CASCAMITE, and CASCO—at your hardware, paint, and lumber dealers.

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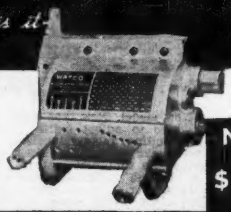

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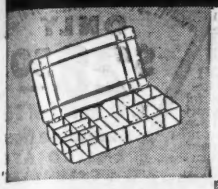

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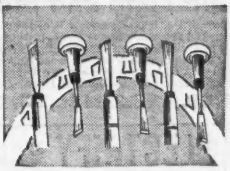

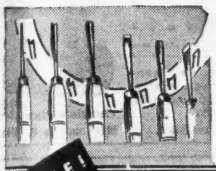

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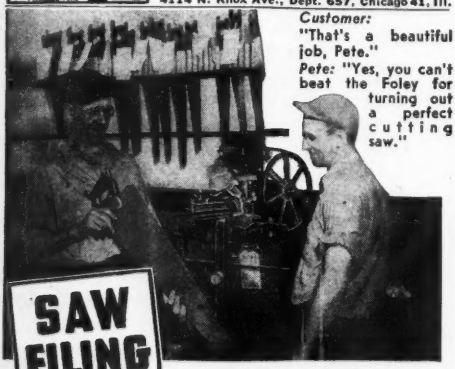

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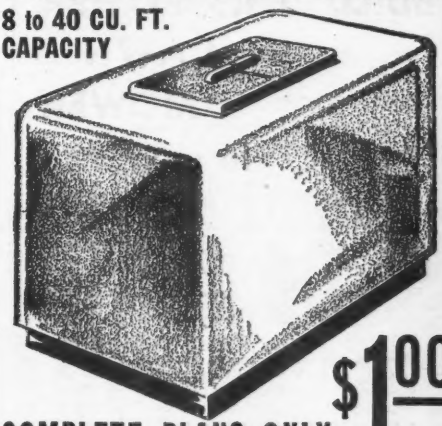

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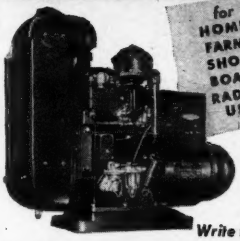

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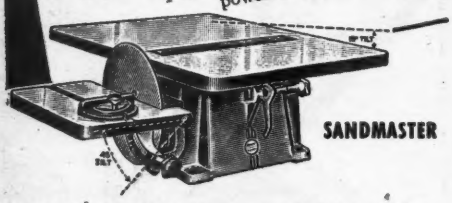

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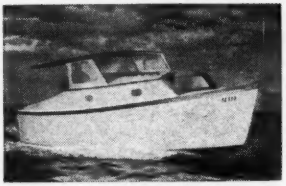

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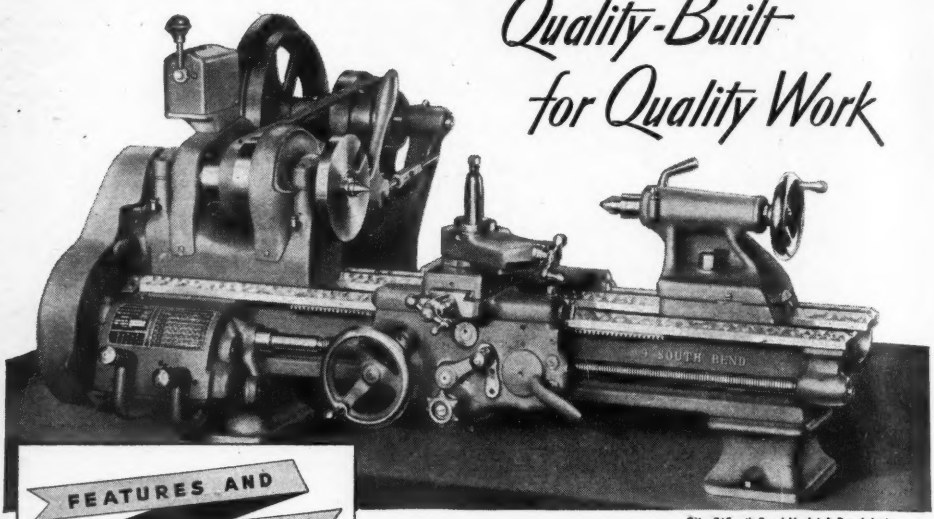

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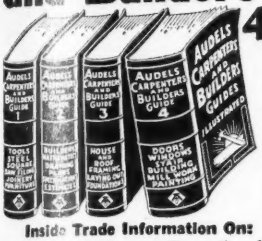

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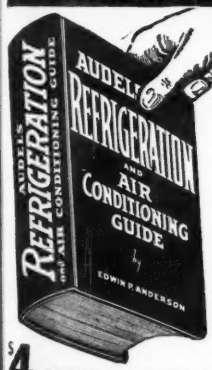

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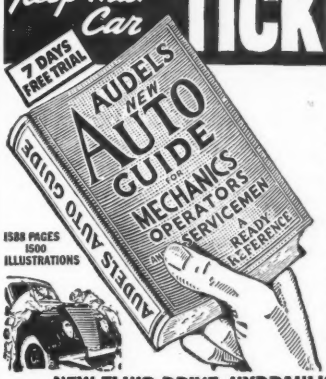

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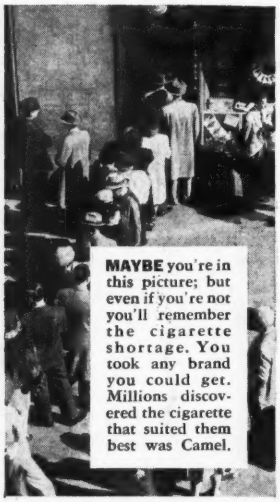

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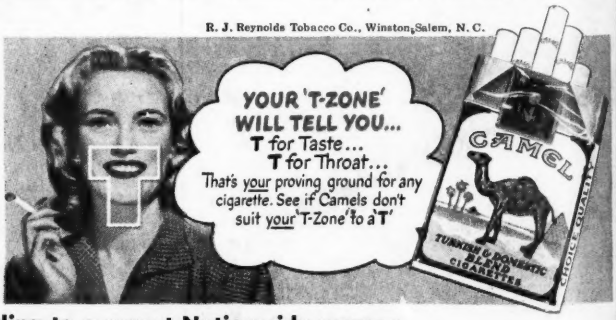

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